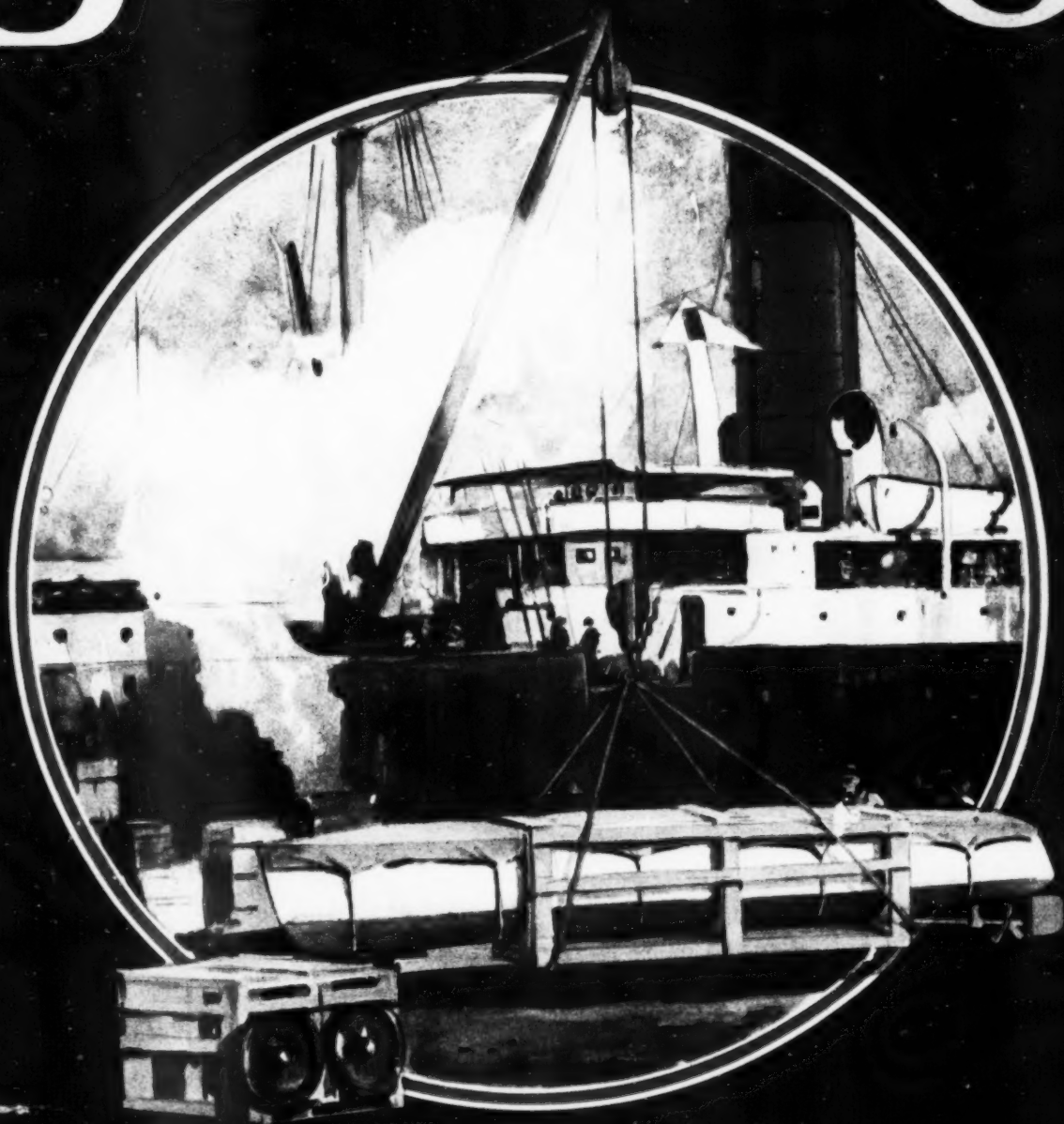


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MOTOR BOATING

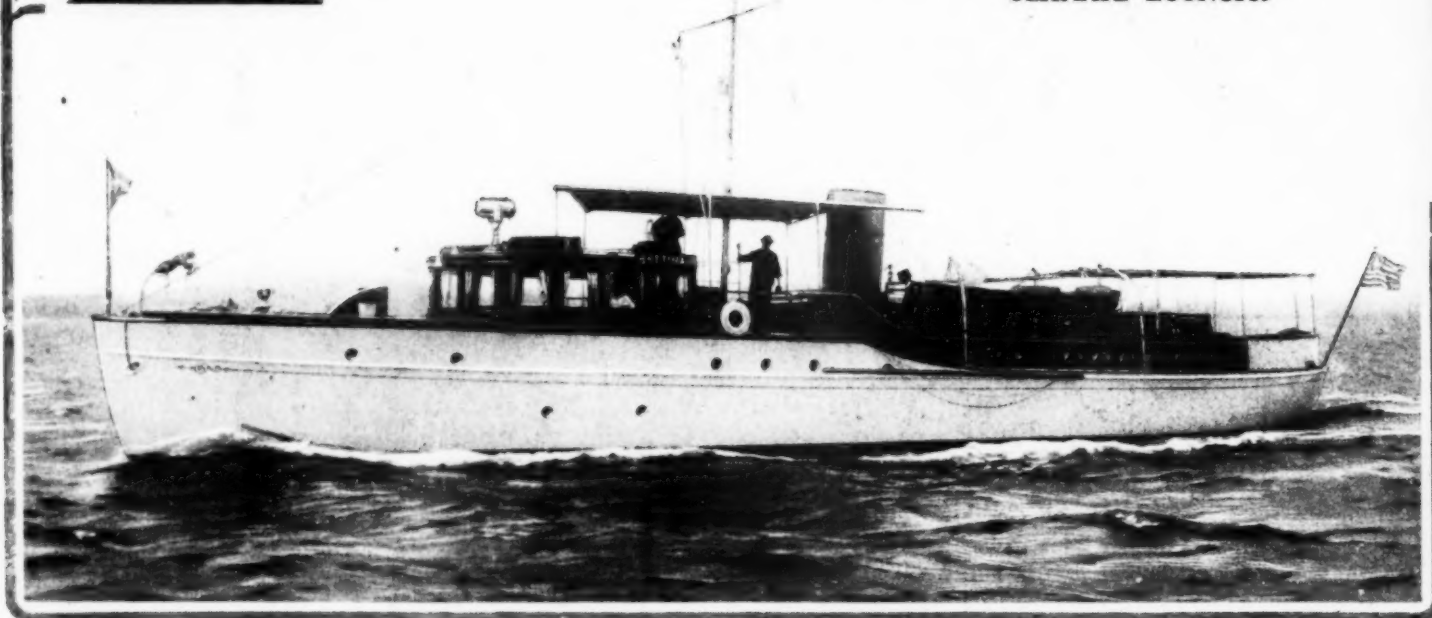


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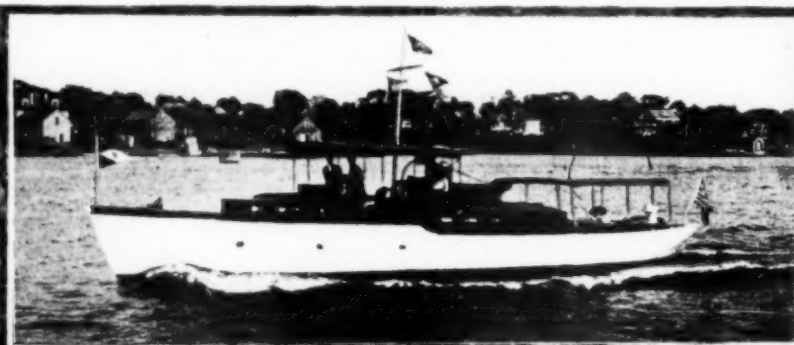
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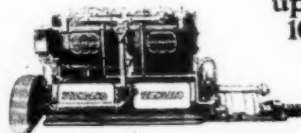
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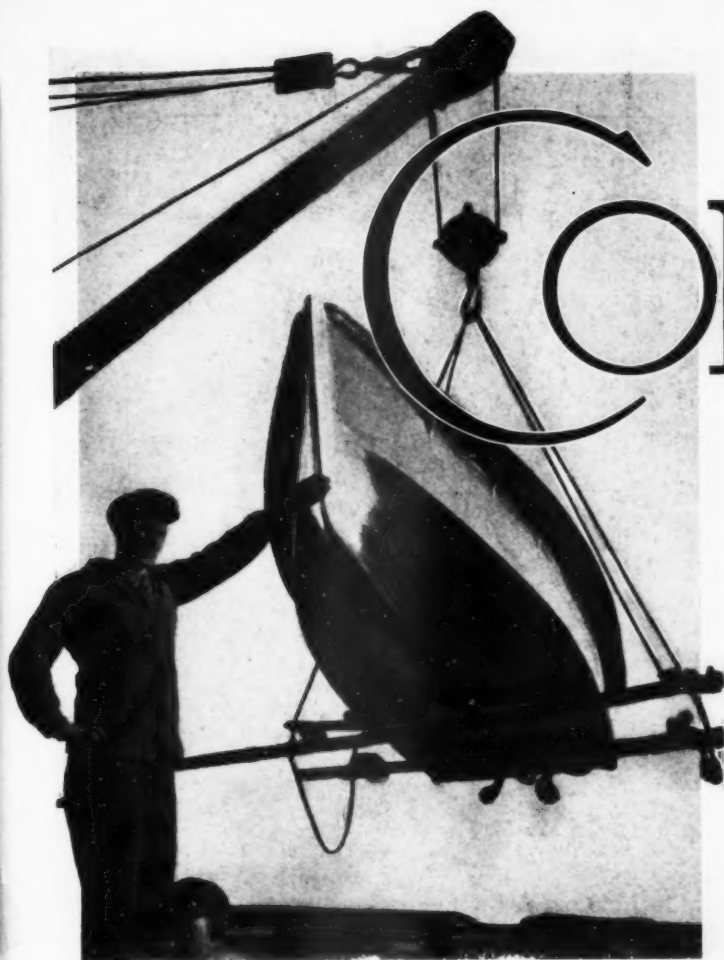
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representatives of other engine makers have to admit that
this is the best in the world. In fact, the STANDARD
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reliable, but also.

Very truly yours,
Wm. H. Brown.

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The National Magazine
December, 1911

**MOTOR
BOATING**

of Motor Boating
Vol. VIII. No. 6

Entered as second-class matter at New York, N. Y., Post Office.

Copyright, 1911, by New Publication Company

Published Monthly by NEW PUBLICATION COMPANY, 381 FOURTH AVENUE, NEW YORK CITY

G. L. Willson, President

George von Utassy, Treasurer

C. J. Shearn, Secretary

Telephone: 7100 Madison Square

Cable Address: Motoriz

25 cents a copy. Subscription, \$3.00 a year.

Foreign Postage, \$2.00.

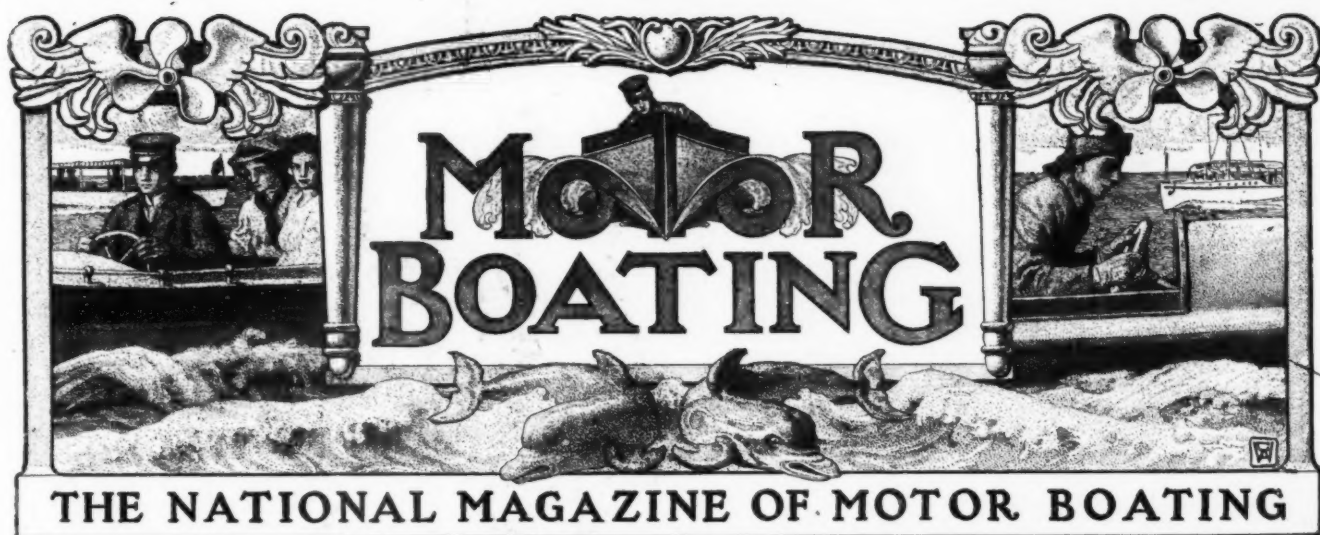
European Agents: Saarbach's News Exchange, Mainz, Germany.



HELENE.

For description see page 96.

Photograph by Greene.



The Motor Boat Industry To-day.

The Present Situation in the Allied Branches of the Trade
After a Successful Season—and the Outlook for the Future.

By Henry R. Sutphen

THE year 1911 will go down in history as one of the greatest years in the development of motor boats. It has been another International year, and again the American motor boat has shown her supremacy over all competitors.

Motor boat racing has done more than anything else to develop the high-speed motor boat, and to it should be credited the wonderful strides that have taken place in this line of development.

But this development has not been confined to the high-speed boat, for our experience has enabled us greatly to improve the open pleasure launch, cruiser and motor yacht, and while the International Race covers but one class of motor boat, the benefits derived from such competitions are felt throughout the industry and assist materially in putting it on a firmer basis.

Through the experiences of several years, experiences often with boats in which the personality and originality of the owner were more in evidence than sound architecture and engineering, we have learned where certain designs, power equipments and details of construction are impracticable, and this has enabled the manufacturers to bring their product to a high degree and perfection and has enabled the public to appreciate the possibilities and limitations of motor boats of the various classes. It has often been said, and correctly, that a boat is a compromise from stem to stern, and the sooner the purchaser fully realizes this, the sooner the manufacturer and the public in general will be benefited by the introduction of the ideal boat in each of the respective classes.

Referring to the engine industry, great improvements have been made in the building of both the two and four-cycle engines, and the increased number of manufacturers entering the field is most encouraging, indicating the growth of the business and the interest shown by capital. While competition is keen, yet the prices obtained for small engines are very good, and the business proves profitable if a large volume can be handled. It is the volume of output which is the limiting factor of the industry to-day. Heretofore, hardly two boats were built alike, and, consequently, various sizes and makes of engines were demanded by the motor boat builders, but to-day with the numerous lines of boats of stock design, there is a tremendous field to cover. And not only for the stock boat, but for the home-made launch, the business boats, the converted craft and the auxiliary, the manufacturers of small engines have found their business increasing steadily.

The large gasoline engine business, principally in the four-cycle type of motor, has grown very rapidly and has experienced a most prosperous year. The largest engine now building, operating on gasoline, develops 500 horsepower. Engines

above 100 horsepower are, of course, usually installed in boats built specially, to order, which gives them a limited output; nevertheless, the popularity of the motor yacht is rapidly increasing and, year by year, more boats of this type are put in commission, with consequent increase in demand for large motors.

One of the best signs in the development of the industry is the effort made by leading manufacturers to specialize in sizes and types of boats for the building of which their plants are best equipped. The open launches, from the power canoe to the cabin boat and of all speeds, are now manufactured in large quantities as stock boats in both wood and steel, and each type has been developed to a high state of perfection. As the output is correspondingly large for the builder of suitable small motors, he can reduce the cost of manufacture and the net selling price, and consequently, the selling price for the combined product can be greatly reduced, and a really better product is made possible than if the engine and boat were built one at a time.

The semi-speed boat has a large field and is in great demand with those who can afford a boat a little larger than the small stock boats, which will have a greater carrying capacity and increased speed. These boats are constantly being refined, and a much better boat of this type can be offered to-day than ever before because of the perfection in details of design and construction, and at a price considerably less than heretofore.

High-speed motor boats have become very popular, due to the unusual speed that it is possible now to obtain at a most reasonable cost, and the fascination of driving over the water at express train speed. These boats are again divided into two classes, the displacement and the hydroplane models. Boats of speeds from 20 to 30 miles an hour, of the displacement type, are now manufactured in quantities by a number of firms.

It was not possible to obtain power equipments suitable for this type of boat two or three years ago, as the engine manufacturers did not consider that it was worth while to build high-powered light weight engines, but from the experience gained by building one or two a year, they have gradually perfected their designs and with the improvement also in hull design and construction, the combined boat and engine has proved most successful and is now being placed on a manufacturing basis.

As stated in the beginning, the year will be remembered as the period in which the greatest development in the high-speed motor boat has taken place, due to the International racing event and the introduction of the hydroplane mentioned elsewhere in this issue.

There still remains a great deal to be done in the development of this type of boat, which can be successfully accom-



The CRUISE of the POLAR BEAR

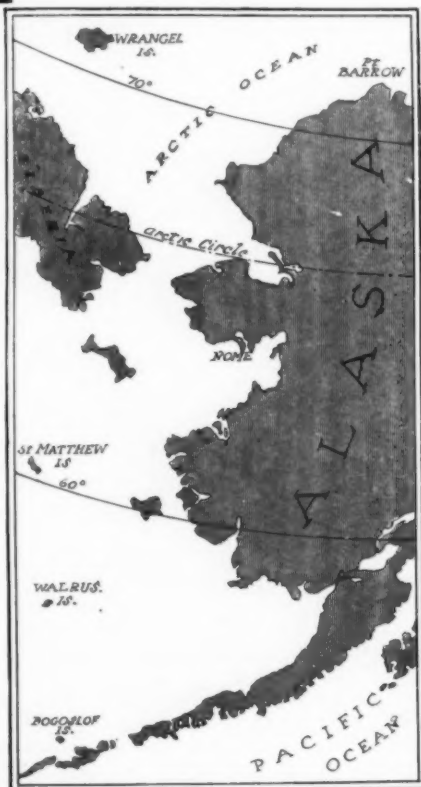
shore ice and the beach during a heavy blow. When he left for the North on June 9th of this year, he took the new schooner

Polar Bear, which had been expressly built for him for the trip just completed. The vessel is perhaps one of the best schooners that has ever been built for work in the far North. She is 85 feet long, 20 feet beam and has a depth of 9 feet. Her construction is entirely of Douglas fir, which has been found by experience to be without an equal for Arctic work. So close are her forward frames placed that that portion of the vessel is almost solid. The planking is $2\frac{1}{2}$ inches, and in addition to the regular fastenings they are edge-fastened. Her ceiling is about the same weight as the outside planking. For about 2 feet above and below the waterline she has a sheathing of Australian iron bark to guard against chafing in the ice. As a further precaution against ice, her forefoot is shod with steel plate for several feet. Her power plant consists of a 75-H.P. Frisco Standard. A small Fairbanks Morse engine provides power for a small lighting plant. She can accommodate ten people in her forecabin, while her aft cabin has room for eight more.

Nome was the first objective point for the Polar Bear after leaving Seattle, and she proceeded thither by the inside passage. The party which she carried included Captain Lane, his wife, who went ashore at Ketchikan; F. E. Kleinschmidt, magazine writer and photographer; Dan G. Lane, a nephew of the Polar Bear's master; Prof. A. C. Bent, of the Smithsonian Institute, and R. H. Beck, a taxidermist in the employ of the same Institution, and an assistant. The last three mentioned joined the party at Dutch Harbor.

CAPTAIN LOUIS LANE is a veteran of the far North, and his name is known throughout the length and breadth of the Pacific Northwest. When on October 18th the gasoline auxiliary schooner Polar Bear was brought alongside the dock in Seattle, Captain Lane completed not only a remarkable voyage for a gasoline-propelled vessel, but also finished a pioneer voyage of exploration. The objective point of the trip was the little-known Wrangel Island, lying in the Arctic, some distance off the north coast of Siberia. Lying well above the 72d parallel and 450 miles northwest from Nome, Alaska, this island has been reached but once before. Although eight attempts have been made, the only successful one in the past was that made by the United States exploring vessel Rodgers, which skirted the shore a distance of several miles and made sketches of the island. Capt. Lane, however, was successful in making a landing, followed by a very successful hunting trip ashore. "Farthest Westward" in the Arctic has always been accounted a record to be proud of by trading vessels in that locality, and Captain Lane's achievement is regarded as a noteworthy event.

A year ago Capt. Lane unavoidably lost the schooner Helen Johnson in the ice, having been caught between the



Polar Bear nosed her way northward through the Arctic waters as far as Wrangel Island.



A herd of walrus on floating ice encountered in Bering Sea.

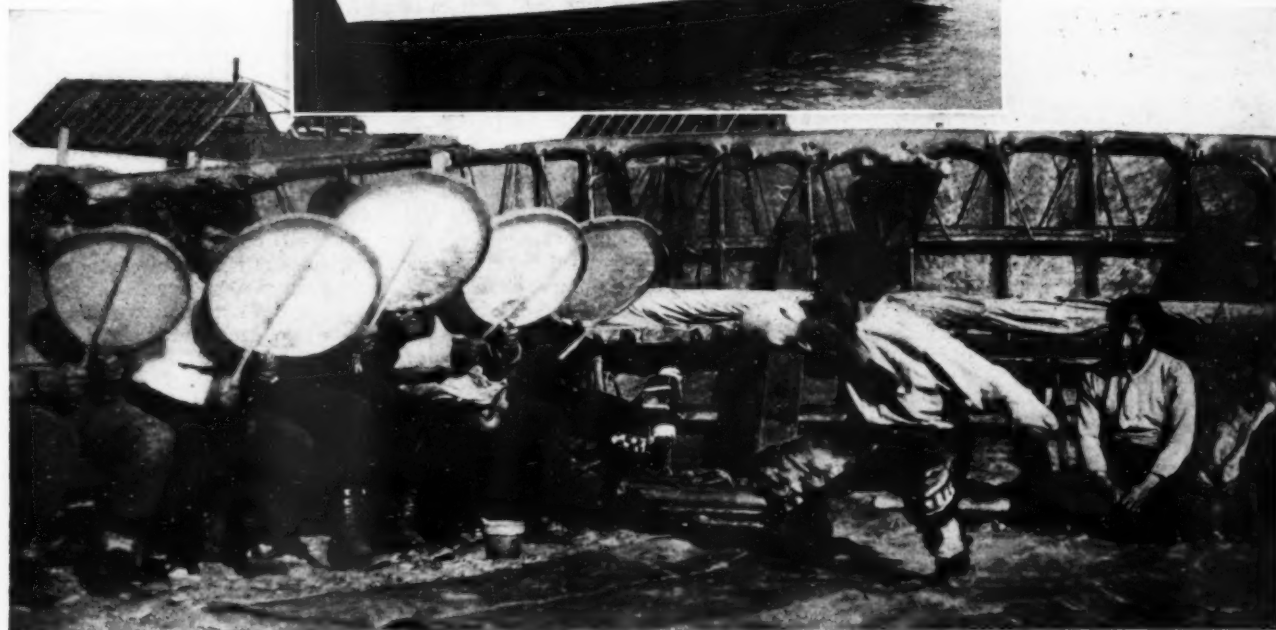


Not only for the distance westward is this voyage of the Polar Bear remarkable. On her way northward, her master took her into the open water in front of a glacier so that moving pictures might be taken of the huge sections of ice constantly breaking off and falling into the water. The peril of this feat is known to all who are familiar with glaciers. The tidal waves caused by the falling into the water of these huge pieces of ice make a near approach to the face of the glacier extremely hazardous, while the wave is often of sufficient strength to throw floating ice against a vessel and crush it. When one of these pictures was being taken, an immense block of ice, which Cap-

tain Lane estimated weighed more than 100,000 tons, crashed into the water, the wonderful scene was registered by the moving picture, although the tidal wave which followed threatened to swamp the tiny craft.

Bogoslof Island, far out in the Aleutian chain, was touched at by the Polar Bear, and appeared to have recently undergone a complete change though no eruption of this volcanic formation was evident at the time. In place of a group of small islands, one large island was found standing high out of the water, and while it appeared to have been standing there for centuries, the change had

(Continued on page 114.)



The auxiliary schooner Polar Bear and scenes she visited. Above, a seal rookery on the Pribilof Islands; note the patriarch in the upper right hand corner. Below, Eskimeaux engaged in the festivities of the seal dance; note large skin canoe in the background.

Present Tendencies in Design.

The Recent Marked Development Along Certain Lines as Shown in the Past Season's Boats.
What We May Expect for the Season of 1912.

By Gerald T. White.

NOW that the 1911 season is over, except for those lucky ones who live where there is perpetual summer, it is time for us to look back over the past year and determine what advances have been made in the design and construction of motor boats during that time. Almost every one who has kept abreast of the racing news for the last year has realized the great advance that has been made in the design of speed boats. Of course, this is due to the fact that hydroplanes were not really considered seriously until toward the end of the season of 1910 when Pioneer and Zigorella came over here from England and came very near finishing up Dixie III at Larchmont. All last winter various designers, or "would-be" designers, were burning up the midnight oil "doping" out "planes" that would "clean up" any boat afloat. Naturally, most of the amateur, and many of the professional attempts were utter failures, as far as speed goes, but they served their purpose in showing other designers what principles they could eliminate.

The names of several boats, in consequence of their performances, stand out so clearly that they are known to every racing man in the country. An interesting thing about them, too, is that the three that are probably the best known represent the three types of hydroplane construction, namely: monoplane, and had the forward plane put on afterward. Fauber type which was really the pioneer of successful planes.

While representatives of all three types happened to be the three most successful boats, the trend, however, was towards the monoplane as being stronger and easier to build. This trend, however, only applied to boats in the 26-foot and under class, as a 40-foot monoplane is almost out of the question where extreme speed is desired. Clinton Crane, however, combined one of the greatest monoplane advantages with a biplane underbody, when he had Dixie IV built as a monoplane, and then had the forward plane put on afterward. In this way he provided for the greatest strength and also obtained much greater stability with but little more surface exposed to the water.

As far as any displacement boats making any speed worthy of particular notice, there was only one, and later even she had planes fitted to her that increased her speed considerably. It is probable that there will not be any boats built for extreme speed work for next season, of the old displacement type, as the chance of winning any of the big trophies with anything except a hydroplane is next to impossible. It is certain that the planes for next season will not be as they are now, for the boats that were turned out towards the end of the season that has just passed were having more and more of the features of the displacement boat worked into their design of the hulls above the water line so that it was next to impossible to tell a plane when you saw one unless it was in motion.

A new system of transmission of power between engine and propeller was incorporated in several of the hydroplanes last season. It consisted of either a set of gears or a pair of sprockets and a chain between the engine and the shaft. The shaft was geared so as to run at about twice the speed of the engine, the idea being to ensure greater reliability, as it is a well known fact that the average gasoline engine cannot be run continuously at a speed of more than 1,200 r.p.m., without danger of some part letting go, and as most hydroplanes require a propeller that can run at from 1,500 to 2,000 r.p.m., it is advantageous to use a smaller propeller. When gearing the engine down, it is possible to turn the propeller at the required number of revolutions without over-speeding the engine. Of course, there is a slight loss of power in the gears and there is also a loss owing to the decreased number of revolutions of the engine, but the increased reliability of the machine running at normal speed makes up for the loss of power.

An example of the truth of this is the fact that one of the celebrated racing boats last season was fitted with a gear propeller and ran without a skip all the early part of the season, winning wherever entered. Towards the end of the season she was fitted against a faster boat, and her engineer, in attempting to hold his own, opened the engine up to about 1,500 r.p.m. Formerly she had been winning with an engine speed

of about 950 r.p.m., and the engine went bad after a few minutes' running out at this speed. It can be easily seen that the boat could not have achieved her early success if it had been necessary to run her engine at 1,500 r.p.m. in all her races. Of course, there are some engines that are capable of high speed for considerable time and it is not necessary to gear the shaft when an engine of this type is used.

This does not mean that there will be no more displacement boats built, for the average man does not feel it necessary to travel through the water at "express train speed," neither has he the money or inclination to install and run one of the light, high-speed engines, for, although they are capable of wonderful things in the hands of competent engineers, they will not always give good service in the hands of the average motor boat man that is used to the regular type of motor.

In speaking of displacement boats, we usually mean boats that have a round, or at least curved amidship section, but the V-bottom boats have become so popular during the last season that the definition will have to be broadened to include these boats. This type of boat was made popular by a New England designer, who has turned out hundreds of them, and the demand seems to be getting greater every day. This is due almost entirely to the fact that outside of the flat bottomed skiff, the V-bottomed boat is the most simple type of boat for the amateur to construct, as there is no bending of frames, and very little difficult planking work, as most of the planks are put on straight. Although the boats are very simple to build, they are comparatively fast, even when equipped with low powered engines, and owing to their sharp section forward, they make very good sea boats. Taken all in all they are a type of boat that is unquestionably good, and it is positive that they will be seen in increasing numbers this coming season.

The popularity of the ocean contests of the season before last resulted in some new features being incorporated in the design of cruising boats, last season, and doubtless there will be just as many improvements in this year's craft.

The raised deck type for small cruisers, of course, was the most popular, and as yet there is nothing that can supplant it for work where the most possible room is to be combined with ability to go out in all kinds of weather. The trunk cabin style was used in a few cases where the boats were to be used principally for day work, and all the light and air possible was desired. There is no doubt but what the trunk cabin type of boat has some advantages over the raised deck for day service, and in fact there has been a slight tendency for the pendulum of public opinion to swing back to them.

There was a marked increase in the provision for light and air in all cabin boats. The majority of the raised deck boats had a trunk with drop sash for half of the raised deck and the interiors of the cabin houses were finished in either white enamel or in some light colored wood, varnished, the hangings and cushions being of light covered material.

The cruisers last year were roomier, more seaworthy and generally more desirable than the product of the year before. This was especially seen on the larger sizes of boats that were intended for ocean racing or long outside cruises. The hulls were built deeper, with more dead rise, without trying to limit the draft, resulting in a hull that did not float on the troubled surface, but went down deep into green water and held on when there.

There was also a marked increase in the power that was installed in these boats, which resulted in their making speeds that a few years ago were considered a creditable performance for speed boats. Very few of the larger size cruising boats had speeds much less than thirteen miles per hour, and it won't be long before fifteen miles per hour will bet the ordinary performance of the average craft. The construction was generally heavier, the frames being usually stiffened with ample bilge stringers, and sometimes with hog frames also. The style was changed considerably also, the canoe or compromise stern losing favor somewhat, and the steamship and transom sterns gaining friends. The steamship stern was used on several of the larger types of motor yachts, and on one in particular, turned out by an Eastern firm, this stern was used

in connection with a steamship bow and double stacks, in fact, the whole boat was a small ocean liner without, however, any look of being a model.

There was some result of the Western designer's campaign for pilot houses on the larger motor boats, and it is probable that this year will see a large number of boats turned out with protection for the steersman.

The increase in the number of commercial craft was marked, as was also the better accommodations that were provided for the crew in boats of this class. The fishing and pilot boats that are being turned out on the Pacific coast are good examples of what may be done with commercial boats that are intended for outside work in all kinds of weather at all seasons of the year.

One of the salient proofs of the increasing confidence in the gasoline engine was the building of three motor yachts that were larger than anything that had been turned out the year before. One of these boats was 140 feet over all, and was modeled on the old steam yacht type with clipper bow and a bowsprit and a steam yacht stern. In fact, the boat could not be told from the average steam yacht unless one went below decks, when he was impressed with the exceptional roominess of the interior, for the yacht has the room of the regular steam yacht of much larger dimensions. The other two boats were 138 footers, but they were of a new type—that is, new for yachts of that size, for they retained none of the features of the steam yacht except the dummy stack, and nowadays the stack is not retained in order that the boat will have the appearance of a steam yacht, but because the stack has been found to admirably serve the purpose of ventilator for the engine room, and also serves as a vent for the galley stove pipe, thus doing away with the unsightly Liverpool smoke head.

The largest number of the motor yachts of the past season were equipped with either twin or triple screws, and even the smaller types of boats from 30 to 40 feet long were often fitted with two engines. Boats so fitted are practically sure of being able to get to harbor, for no matter what happens to one engine, the other will always have power enough to enable the boat to be brought to a place of safety, for the chance that both engines will break down is too small to be considered.

The increased simplicity of the marine gasoline engine has also made it possible for one man to control both the boat and engine from one station by a system of rods and levers reaching to the bridge or to wherever the steering apparatus is

located. Of course on the very large yachts this system is not usually used, as it would mean too much work for the man at the wheel, but for boats up to 75 feet long it is very practical, and means that the owner is not obliged to have more than one man in the crew, if he is willing to take a hand himself when making landings, etc. This means a saving of from \$80 to \$100 a month, and if the owner is of practical bent it is possible for him to do away with a crew entirely, only having a boy to clean up, handle lines and occasionally take a trick at the wheel.

Commercial boats are practically all being rigged for one man control, and in some cases there is a system of clutches that enables one man not only to control boat and motive power, but the winches, derricks and other machinery that usually is part of the equipment of commercial boats. Some of the fishing boats of the Pacific Coast are fitted with compressed air controls that enable one man to control everything without straining at heavy levers, for by opening or shutting a valve the various clutches and drums are put in or taken out of operation; and it may not be long before we shall see such boats controlled from a switchboard without any great effort on the part of the skipper. In fact, several of the new boats are equipped with mechanical steering gears.

The large demand for boats for use where there is shallow water resulted in the tunnel stern being brought into prominence, particularly in the case of motor houseboats that are intended to run up into the shallow creeks and basins where there is often excellent hunting and fishing.

The past season resulted in some remarkable houseboats being turned out by builders all over the country. Before last season houseboats were usually slow, unseaworthy craft with only power enough to barely move the boat in good weather, but last season produced some boats that were not only seaworthy, but which had speeds in the neighborhood of ten miles per hour, that enable them to go almost anywhere; in fact, several of them cruised practically the entire length of the Atlantic Coast, carrying large parties as comfortably as if they were aboard of an ocean liner. These boats were all fitted with twin screws and had the propellers run in tunnels in order to safely navigate the shallow southern streams and bayous.

Taken all in all, the past season showed the greatest advance in the history of the sport, and from the plans that are already made for next year all records will be broken and one of the most glorious of recreations will be brought nearer to those who are still uninitiated.

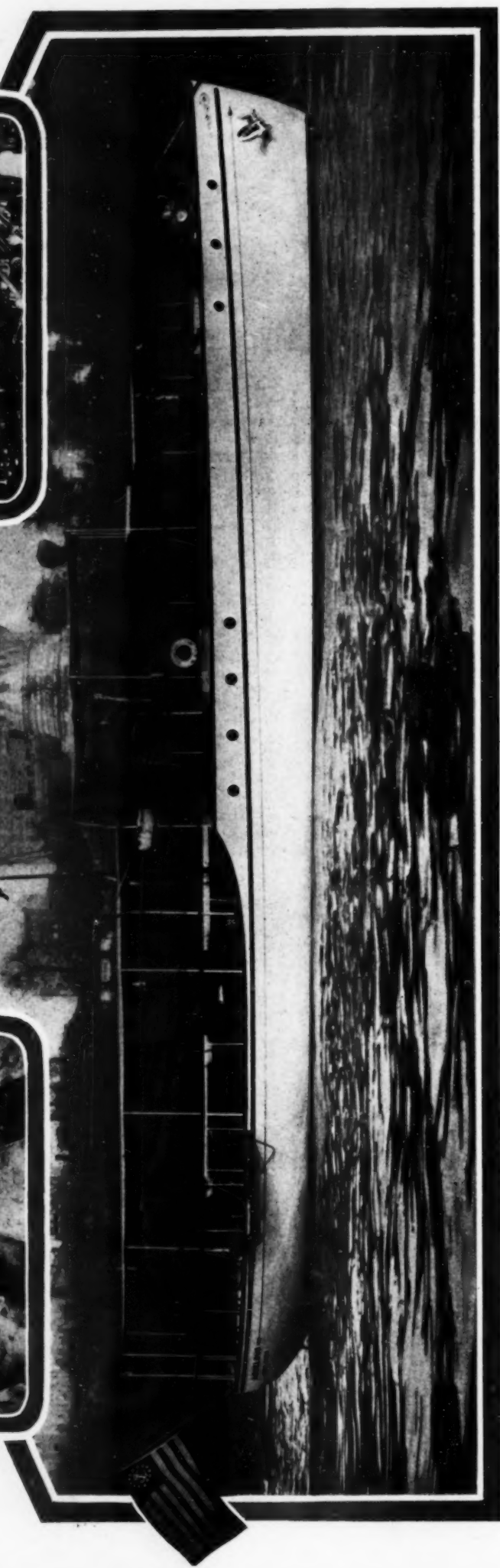
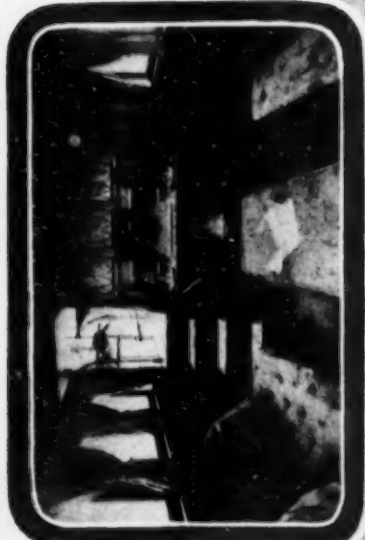


By skillful manipulation of the helm and thanks to a motor that kept going, Capt. Klaus Larsen again successfully navigated the whirlpool rapids, the whirlpool, and the lower rapids of the Niagara River in a fifteen-foot motor boat. He may next attempt a trans-Atlantic voyage in the same boat, which is equipped with a 10-h.p., 2-cylinder Scripps motor.

ACHELOUS.

The deck house is used as the dining and lounging saloon, and, although sunk below the level of the raised deck for appearance, it is still possible to see out of the windows when seated.

The twin engines are installed in a light, roomy, and are controlled from the bridge. Note the electric light plant mounted on the bulkhead.



A CHELOUS, designed and built by Frederick S. Nock, East Greenwich, R. I., for Edward F. Lawson, Esq., New York City, is a strictly up-to-date power cruiser of the raised deck type with deck house and cabin trunk. Her draught is moderate but at the same time it is deep enough for the average runs along the coast in summer weather and shoal enough for cruising in Southern waters. Her power plant comprises two Murray & Tregurtha 4-cylinder engines, $6\frac{1}{2}$ in. bore, 8 in. stroke, turning propeller of 28 in. diameter, 40 in. pitch, 470 r.p.m. at the maximum speed, driving her 11 nautical miles per hour. These engines, which are controlled from the bridge or can be operated on signal, if desired, are fitted with every attachment that can be devised in order to insure smooth running, and to eliminate as far as possible any chance of their stalling.

She is not what one would call a lightly built craft by any means. The keel stem, stern crook, deadwood, etc., are of oak, sided 7 in., frames of white oak, sided 2 in., moulded $2\frac{1}{2}$ in. at heel and 2 in. at head. The bilge clamps are 2 in. x $6\frac{1}{2}$ in., deck clamps 2 in. x $7\frac{1}{2}$ in., shelves 2 in. x 4 in., raised deck clamp 2 in. x $4\frac{1}{2}$ in., all of yellow pine. The planking is yellow pine $1\frac{1}{2}$ in. thick, single thickness below the waterline and double thickness above waterline. The keelson is of yellow pine, 2 pieces, 3 in. x 8 in. The sister keelsons are of the same material, 35 ft. in length, 3 in. x 15 in., two on each side. They are cut over the frames and closely fitted, and bolted to each frame. These keelsons, besides increasing the longitudinal

strength of the hull, also distribute the strain of the engines, as the engine beds are fitted inside of the sister keelsons and well fastened to them. The strength is further increased by the addition of diagonal bulkheads at either end of the engine compartment. The deck frame is very heavy, the beams being of oak, sided $2\frac{1}{4}$ in., moulded $3\frac{1}{2}$ in. The planksheer and deck are $1\frac{1}{8}$ in. thick, the raised deck is covered with canvas and finished with mahogany waterways. The main deck is bright and finished with mahogany planksheer and waterways. All the exterior finish is of mahogany, including the cabin trunk, dining-room, deck house, bridge, hatches, etc. The owner's quarters are finished in mahogany

A 75-Foot Motor Yacht Designed for General Cruising.

throughout, the engine room and crew's quarters in oak and cypress.

The owner's stateroom at the after end is certainly commodious, a double berth, divan, two wardrobes, bureau, desk, folding lavatory, etc., all tend to make a finely appointed room. The general furnishings are in strict harmony, green velvet carpets, cushions, upholstery and draperies of green blend nicely, and all the rooms are fitted in this manner; even the electric light fixtures are finished in verd bronze.

The saloon forward is an ideal lounging place in bad weather; heavy plate glass windows admit of a view in any direction, and this saloon is also arranged as a dining-room.

Her general dimensions are: Length, overall, 75 ft.; length, waterline, 70 ft.; breadth, extreme, 13 ft.; draught, extreme, 4 ft.

Picking the Power Plant.

The Principal Considerations That Should Go to Make up the Choice of the Motor Best Suited for Any Given Set of Conditions.

By Edward B. Church, M. E.

THE boat is on the beach, or under cover for the winter; the motor, let us hope, has received attention, and has been "slushed" with some wonderful preparation which will be harder to remove in the spring than rust would be.

Perhaps the last trip of the season was not an entire success; some friend may have passed you on the way home, or your motor may have developed one of those mysterious ailments that even the family physician could not diagnose.

"Never mind, next year we will have a new engine, or a new boat, or both, substantially built, you know, but not too heavy; a good sea boat of course, plenty of room and power, and lots of speed."

So the yachtsman dreams, and sometimes dreams come true, but the forces of nature, that seem to sleep when we do, loom large on the trial trip.

The principles of naval architecture are well understood and are carefully applied in the construction of large commercial vessels, assuring success at the start. With small pleasure craft the variations of type and form of hull and in engine design are so great that the utmost care is essential if satisfactory results are to be attained. Unfortunately, the designer's fee in such cases is so small that he cannot afford to go very deeply into the matter. We are at sea in a mass of incomplete data and the tendency of us all to see rose tints in our own handiwork adds to the confusion.

This is not a treatise on naval architecture or a yachtsman's guide to paradise, but an attempt to buoy some of the rocks and shoals that poor humanity is always encountering.

THE internal combustion marine engine developed in the last ten years from the toy "kickers," with which every man was his own engine most of the time, to the twelve thousand horse power units now building for the British navy. It has been improved in design and construction until it is the equal of any power producer in reliability, durability and efficiency.

Every motor, built by a reliable concern, represents a sincere effort to produce the most satisfactory motor for the least cost, but being, in any case a compromise between conflicting requirements, engines will vary in design with the ideas and prejudices of their constructors.

The problem before the yachtsman is not necessarily to pick out the best engine, but to select that which is most suitable for his purpose, and which will give the best results under his particular conditions. These conditions vary with the size and type of boat, and as the small, low-powered craft is entitled to a handicap we shall start her first.

ALMOST every yachtsman, while bending to the oars, has been passed by a friend, wearing a smile of derision, in a similar boat fitted with a motor. At such times it is fitting and proper to register a vow that next year your tender will have a motor, too.

One of the single-cylinder, two-cycle, high-speed motors, from one to three horsepower of which there are a lot of good ones on the market, seems to fit the conditions. Of course, a two-cylinder may be used, but two-cycle troubles usually increase with the number of cylinders, and there is not much to be gained by their use in small installations.

The lighter the motor the better. You may want to hoist her on davits or deck sometime. A high-speed engine means a small propeller, and a large one does not help when

beaching a boat. Keep your carburetor as high as you can, for tenders are often full of water. Under the deck forward, if there is one, is a good place for the tank, which can be very small. Remember that a small boat changes trim a good deal, and you always need a good head for the gasoline. Look out that the water cannot back through the exhaust pipe and flood the motor. It may be well above the water line when the boat is at rest, but tenders stand on end when towed. Make and break ignition is good, but the high-tension systems where the plug and coil are combined are even better, because then the exposed working parts can be made almost entirely of bronze or composition, and are not rusted or stuck by the action of the water. If the engine you select can be readily reversed by the spark lever so much the better, but don't put too much faith in your ability to do it every time. The "dink" that goes at the float head on too often eventually comes to grief.

If you are a mechanic or wish to serve an apprenticeship at the trade, buy one of the small, single-cylinder automobile engines, like the imported De Dion-Bouton, for example. This is a remarkable little engine and the writer has driven a fourteen-foot tender nine miles an hour with one running seventeen hundred revolutions a minute, but there is a lot of work to be done to install one properly.

THE owner of an open or cabin boat of usual type, that is too large to be classed as a tender, and too small to be dignified by the name of yacht, has a large field from which to choose an engine. If expense is an object to be very seriously considered the two-cycle engine of one or two cylinders stands out prominently. It is simple, efficient, easy to operate, and if not too cheaply constructed will give excellent service.

The lobstermen of the New England coast are almost all equipped with such motors, and put to sea in any weather with the utmost indifference.

If you can afford it, a three or four-cylinder four-cycle motor will be a good investment. Remember that speed is not what you are after, and that in any case it is secured by great sacrifices in other important directions. Low engine speed, say not over five hundred revolutions, and fairly heavy construction, are good points. Get power enough, so that you will not have to run "wide open" all the time.

Leave the automobile type motors alone; they have their uses, and are splendid examples of motor design, but are built for very different conditions and will rarely give satisfaction in such craft as we are considering.

The writer has seen high-grade automobile motors practically ruined in one or two weeks' service, after being carefully installed in boats of this type. They are not designed to work at full load, except for short periods and a boat under way is going up hill all the time. Their rotative speed is too high to use an efficient propeller for such boats, and their lubricating system usually does not work well at any appreciable shaft angle.

AS the size of our craft increases the four-cycle engine forges to the front. Such boats require considerable power, which means large cylinders or a number of them, especially if the engine speed is as moderate as it should be. The question of economy of fuel arises as the motor power increases, and the four-cycle type is somewhat more economical.

When our boat grows in our imagination to, say fifty feet or more, and we use the term yacht with conviction, the four-cycle motor seems to have a monopoly. Moderate speed and substantial construction are just as important now as ever. Four or six cylinders probably will be necessary, but don't use two motors if you can use one large enough for the work, unless some reason, as for instance, extreme light draft, makes it necessary.

Let us stop a moment, before we give the light, high-speed chaps a chance, and consider the case of the poor fellow, becalmed in a sailing craft, a mile or so from shore toward nightfall. He will probably lose his dinner and some sleep, or blister his hands and St. Peter's records, as the only alternative.

We all know what he should have, and the one or two-cylinder, two-cycle, heavy duty motor seems to be the thing. Speed is of no importance but space is; the shaft angle is usually great and a single-cylinder motor is least affected by it. The motor in such installations is usually placed down in the turn of the quarter, where you can't get at any part of it except the flywheel. If he hasn't a power tender to tow him in he had better make up his mind to install such an engine when he reaches port.

THIS is the age of great haste, especially in this country, which probably accounts for our boats being faster than those of some other countries. Speed means extravagance in every direction, but we must have it. The internal combustion engine has given it to us more than a good many realize.

Nine years ago one of the most prominent builders of high-speed steam craft in this country refused an order at his own price for a thirty-five-foot open-boat, to make fifteen miles an hour, saying it was impossible. The boat was ordered elsewhere and a contract placed for the motor with one of the few builders of gasoline engines in business at that time. The specifications called for ten horsepower on the brake, weight not to exceed one thousand pounds, and a speed of five hundred revolutions without undue vibration. Easy, you will say, but the motor failed in every particular, and after driving the boat about ten miles an hour, was returned to the builder.

A motor was then imported, weighing about six hundred and fifty pounds, which developed a little better than sixteen horsepower at nine hundred revolutions, and a speed of fifteen and a half miles was attained.

How we have advanced in nine years! Our pessimistic builder of steam craft has since turned out some of the fastest craft in the country, with the help of gasoline.

SPEED requires light weight. The lines are refined as much as possible, but a heavy power plant spells failure every time. Our hull and motor construction are lightened, better materials are used, but the limit is soon reached. Our designers must save weight through elements of design, and high rotative speed is the easiest and most successful path.

The multi-cylinder, two-cycle type and the automobile motor appear to the best advantage here, where considerable intelligent attention is given them. Some remarkably light and powerful two-cycle motors have been built lately, and one in particular, in a small boat that seems almost unbeatable, makes her almost an aeroplane at full speed.

When it comes to speed, however, we must all lift our hats to the winner of the Harms-

worth Cup, the Derby of power boat racing. Her speed, and especially, her consistent running, show more promises for future development than a wonderful performance one day and a breakdown the next does.

It is almost hopeless to advise the man who is after extreme speed. The problem requires careful consideration by an experienced designer, the best construction possible in motor and hull, careful and experienced handling, and at the best, an enormous expenditure of time and money and many disappointments.

SPEEDS up to approximately three times the square root of the length of the boat may be obtained, however, without great trouble, and a reasonably durable and satisfactory craft for general use obtained.

The multi-cylinder high-speed, two-cycle type appeals to the owner of moderate means, and has been developed to the point where it is satisfactory in operation. The writer may be inclined to prejudice in favor of the four-cycle type, on account of early experience, but would advise the selection of such a motor if the purse can stand it. There are a number to choose from that show the influence of automobile practice, though designed for marine use.

THERE are several misapprehensions, the results of which are frequently seen in practice, that should be spoken of here, probably more common in regard to propellers than any other detail. A propeller is often compared to a screw working in a solid nut, and nothing can be much more erroneous. A vessel is propelled more in the manner of a sky rocket, by the reaction of the water driven away by the propeller, and the power of the engine should be measured by the quantity and velocity of this column of water. For our consideration, the velocity of the column is always greater than the speed of the boat, and as a general thing the greater the size and the lower the velocity the better the results.

This condition requires a large diameter propeller, and tends toward slow rotative

speed. But for engine efficiency, high speed is important, as is shown by automobile practice, where much higher speeds are used, and where the transmission of energy does not present this difficulty. Our ideal motor, therefore, must be a compromise between engine and propeller efficiency, with a tendency toward favoring the propeller in heavy, full-lined boats, and the engine in speed work.

A case might be mentioned here of the installation of an engine of several hundred horsepower, and of a well-known and reliable make, in a coasting schooner of about three thousand tons. When loaded and weighing anchor, this motor, on several occasions, failed to start the vessel against a very moderate head wind, the reaction of the water from the propeller not being great enough to overcome the wind resistance.

ANOTHER point of uncertainty seems to be the effect of engine weight on the question of durability and reliability. Weight, if increased by larger bearing surfaces, or more liberal crankshaft, connecting rods, valve gear, etc., tends toward long life and freedom from broken parts and justifies itself.

When used as an excuse for poorer material, or when caused by very thick castings, such as cylinders, pistons, crankcase, etc., it is often a positive detriment. In thick iron castings, the grain of the metal is almost always coarser and does not wear so well as in thinner ones. In marine motors, of moderate size, considerations of strength do not enter much into the design, castings thick enough for the foundrymen to produce satisfactorily being plenty strong enough in most cases.

Most engine failures of the present day are caused by the small parts and accessories, ignition and carbureter parts, lubricators and oil pipes. These are often made much too light, and the fastenings used are much too small. In any case, substantial proportions of small parts and bolts cost little, and are conducive of great peace of mind.

MANY boat owners worry considerably over the quality of gasoline now furnished by our greatest corporation, and compare its test on the Beaume scale with much disfavor. The refiners have been forced to lower the volatility of their product, in order to get all that can be called gasoline out of the petroleum, and avoid a surplus of the other products. Carbureter design has kept pace with them, however, and the reader should remember that the present fuel has more heat units, and if properly volatilized, should give more power.

There has been a great deal of experimental work on motors, designed for the heavier petroleum products, alcohol, etc., and some very excellent results obtained. Kerosene seems to present the most immediate possibilities, and several engines using this fuel are now on the market and give satisfaction. The lessened risk of fire and explosion, and the lower fuel cost are their strong points.

It is somewhat difficult to obtain kerosene in quantity on the water front and mechanics familiar with the details of these engines are not so easily found if repairs are wanted. Both of these objections have no bearing on the technical side of the question and will be overcome in time. As a matter of fact, any liquid or solid hydrocarbon can be used as fuel in an internal combustion engine, if properly volatilized, which is usually done by the application of heat, either in the carbureter or in the engine itself. It has not been brought to as perfect a solution as the methods of burning gasoline for fuel, but probably will be before long, as it is receiving the attention of a number of experienced engineers, particularly abroad.

In conclusion, buy of a responsible and experienced manufacturer, and buy the best you can afford, but don't put it all into horsepower at the expense of careful, substantial construction. Get power enough so that you will have a little in reserve all the time. Incline toward moderate motor speed, and remember that success in a builder's trial or a race, is not the usual service required of a motor boat.

15,000 Miles Under Power and Sail.

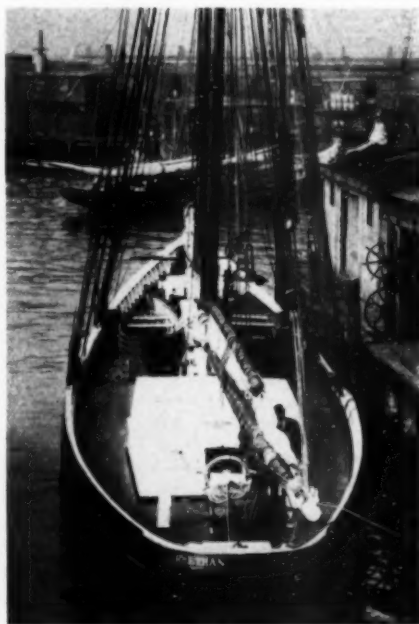
Two Modern Boston "Fishermen," Equipped with Gasoline Auxiliary Engines,
Sailing from T-Wharf Around South America to Seattle.

By George Story Hudson.

TWO bowspritless schooners hailing from Boston have started on a 15,000-mile passage to Seattle, Wash., from which port they will engage in the halibut fishery. These vessels, 100 feet overall, are auxiliaries powered as heavily as any others of the large fleet that harvests deep-sea denizens in the North Atlantic.

The Victor and Ethan is the pioneer. Her skipper and owner, Capt. Herbert W. Nickerson, of Malden, Mass., was first to decide on the venture which he takes at his own risk. The Athena is the other. She is commanded and half-owned by Capt. Edward Forbes. Both vessels are of the famous knockabout type and of McManus design. Each has been equipped for the new industry with a 110 h.p. Globe motor, nearly double the power heretofore deemed economical by owners of most of New England's trawlers, numbered by hundreds.

These schooners are practically new and represent a value of about \$16,000 each. They go to the Pacific with sails auxiliary to the motor and henceforth will depend almost entirely on gasoline or distillate for propulsion. Under average conditions they develop a speed of about eight knots an hour and maintain that gait for hours and days, if need be. Capt. Nickerson would not be surprised if the performance of the two stout knockabouts revolutionizes the Pacific fishing industry. He has visited the coast to familiarize himself with



Deck arrangement of the schooner Victor and Ethan. Note the nests of dories.

methods and requirements. The fitting out of the two vessels and departure on the long trip, abandoning the East for the West, with consequent severing of home ties, resulted.

The motors installed in the Victor and Ethan and the Athena weigh about seven tons each. Before they were hoisted aboard from lighters it was necessary to remove considerable of the cement and iron ballast shored snugly over the keelson to make allowance for the weight. Ordinarily, motors employed in fishing vessels are placed in the cabin, but such arrangement in the two knockabouts was out of the question. So a portion of the hold was utilized for the purpose, the compartment being transformed into a room as fully equipped for its purpose as any finds on the best class of commercial vessels.

Two steel tanks with a total capacity of 2,000 gallons were located on the vessel's deck immediately forward of the cabin trunk for storage of gasoline. This quantity, it was estimated, would be sufficient to carry the schooner to her destination without refilling, provided the motor was not called on to work too many hours while in the region of the trades. The tanks were boxed with 3-inch pine planking, dovetailed at corners so as to form a continuation of the cabin house. Scuppers were provided that any leakage might be instantly noted. More gasoline, in steel drums, was taken as a reserve supply.



The auxiliary knockabout schooner Victor and Ethan starting on her 15,000 mile cruise.

With tanks almost overhead the motor feed-pipe is quite short and easily removable in case of obstruction. At the carbureter was placed a strainer calculated to catch any sediment from the tanks set loose during rough weather. A dynamo is suspended from the under side of the deck, the machine serving to light all parts of the vessel through its storage system. The motor, which starts with compressed air, is equipped with a powerful pump that empties the bilge, should occasion demand, and maintains pressure in the several tanks operating whistle and starter.

The schooner's propeller shaft is of steel, $3\frac{1}{2}$ inches in diameter and bushed with bronze, a practice that has been found satisfactory in other large auxiliaries. The Gray-Aldrich Company, of Boston, who installed the motor and have equipped more than 100 other commercial vessels, say steel is stronger than bronze, while the bronze bushing prevents corrosion. Two propellers are carried, both Hydies, one being a three-blade 48 in. by 64 in., and the other, which will be carried on deck for emergency, measuring 48 by 68 in. This latter wheel is two-bladed and, by the way, gives a trifle better speed than the three-blade.

A change of propellers may readily be made by beaching the schooner, unless it is deemed wise to expend a matter of \$25 or so for hauling on a railway. So stout is the construction of these fishermen, oak frames and planking, that they may take bottom for temporary repairs or overhauling without the slightest danger of straining or other damage. A change in propellers was made at Provincetown, Mass., shortly before the start for the Pacific by permitting the schooner to ground alongside a wharf. Between tides the work was readily attended to. The motors in both schooners were subjected to a 20-hour trial at

sea and not the slightest difficulty developed, though the machines were put to this hard work almost as soon as they had been installed. With the machinery stiff and most of the time with retarded spark and half throttle the Victor and Ethan traveled 30 miles in three hours 16 minutes—from wharf in Gloucester, Mass., where the motor was installed, to Commercial Wharf, Boston—where supplies were taken aboard preparatory to the long passage.

The Victor and Ethan's motor compartment is entered through a door in the cabin's forward bulkhead. A stout hatch is fitted to the deck, and by a system of ventilation gases may readily be dispelled. This feature has been carefully worked out because the schooner must battle heavy head seas for days at a time in order to get her fares of halibut to market in good condition. A work-bench, equipped with a variety of tools and a crane for removing and lifting cylinders, or repairs aboard ship, are among provisions that no doubt will prove a solace to the engineer when called on to perform stunts miles from land. An assortment of spare parts will be taken along because there are not many places between Boston and Puntas Arenas where one may stock up with pistons, rings, pump plungers and gears.

The passage of these two schooners promises to be no yachting trip. From Boston they stand over toward the coast of Africa till within a few hundred miles of the land, then catching the trades proceed to the Straits of Magellan without a stop, if possible, till arrival at Puntas Arenas. A deep-water navigator in each schooner assumes responsibility. Crews number 12, including captain and cook, though, while engaged in the fishery 18 to 20 men will be taken. Eight New England dories were nested on deck in place of 14 used while trawling for the T-wharf market. After

passing through the Straits, which will be accomplished under power and will probably occupy about two days on account of strong currents and necessity for anchoring at night, the schooners will make for and cross the equator well out to sea, in order to catch the trades and shorten the duration of the passage to Seattle.

About 100 days will be required to get the schooners to their destination. The estimated cost of feeding the crew is \$5 per week per man. Provisions sufficient for six months were stowed and the water tanks contain 2,000 gallons. It will be the summer season when the little vessels enter the Straits and round the tip of the continent. Thus, they leave winter behind on the passage, find summer weather and again face winter's chill—but that experience will be nothing new to the hardy fellows who face blazing sun on George's Banks and fight stinging blizzards in the same locality, all in the course of a year's work.

Capt. Nickerson proposes to use his motor pretty much all the time in competition with steam schooners after getting settled in the halibut fishery. This will be necessary owing to prevailing calms and tortuous channels where sails would be of little advantage in anything but leading winds. The motor has an attachment for distillate as well as gasoline, so that the cheaper fuel may be employed in the Pacific.

The venture of these two new knockabout schooners will be watched with interest from many quarters. None, however, will be so keenly interested in the outcome of the project as the marine gasoline engine manufacturers. The undertaking smacks certainly of the venturesome, and adventure will no doubt be had in abundance. Here's success to the Yankee sailors!

The Hydro as a Runabout.

The Practicability and the Advantages of the Skimming Type of Boat for Every Day Service.
The Third of a Series of Articles on the Hydroplane by Various Designers.

By S. S. Breese.

THE history of the hydroplane type of boat hull is much like that of the aeroplane, the principle of which was known many years before the mechanical knowledge necessary to the builder who would construct a practical flying machine had been acquired.

Going back over the records of the United States patent office, the writer has found numerous examples of patents granted to inventors whose basic idea was essentially that of the modern hydroplane, and bearing dates showing them to be almost as old as the steamboat. The first scientific experiments with this model of hull were made by Froude for the British admiralty and rose out of the claims made for this type of boat by a clergyman named Ramus. Froude's decision was

could do about 20 miles an hour in smooth water. From this beginning the development has been steady and rapid to such wonderful craft as Dixie IV, Maple Leaf and Pioneer, which are the largest and most powerful hydroplanes thus far constructed. What the limit of speed and size may be it is impossible to tell, as there is undoubtedly much yet to be learned on the subject.

CONSTRUCTION.

THE basic theory, that of reducing displacement and the wetted surface of the hull as the speed increases, and also the classification of the different types of hydroplanes into monoplanes, biplanes, etc., is already familiar to the readers of Motor Boating so that we may pass over these points and

a choppy sea. Naturally, to stand such action the boat must be very stiff and the engine beds unusually strong. In fact, it is in holding down the engine that builders without experience with this type of boat run into their greatest difficulty; it can be done perfectly well, but entails careful workmanship, and the addition of what oftentimes looks like unnecessary weight to the uninitiated. Right here let us understand that we are discussing boats that are practical for daily use at high speed; not ones that have to be overhauled and tightened up after every 30-mile race, and which are, of course, perfectly useless to the ordinary user.

Although the saving of weight is important, it is not nearly so much so as many people think and should be accomplished in the en-



Bug is a single-step hydroplane or biplane 16 feet in length by 4 feet beam. She was designed and built by the Electric Launch Company and is driven by a 60-h.p. Elco motor with which she has made speeds considerably above 30 miles an hour. When she encounters rough water she bounces along like a rubber ball, making it impossible for the man forward to preserve his dignity.

adverse to the adoption of the skimming boat for naval use. But, in this connection, it must be remembered that power plants even remotely approaching in weight per horsepower the gasoline engine of the present day were absolutely undreamt of at that time, and also that Froude based his experiments and conclusions on the idea of using the principle in the design and construction of large vessels.

This rejection of the idea by the British admiralty seems to have effectually killed all serious and scientific research or experiment along these lines, and among naval architects it was relegated to the company of other schemes dear to long-haired inventors and the editors of Sunday supplements, who are always ready to revolutionize the art of shipbuilding and marine transportation. The idea, however, kept cropping up in the heads of various individuals on both sides of the Atlantic, and finally when the gasoline engine had reached the necessary state of perfection a small skimming boat was built in France, which gave remarkable results in the way of speed, and attracted considerable attention by winning the race from Paris to the sea in 1906.

This little boat was about 12 feet long by something under 3 feet beam with one step amidships, scow bow, and not more than 6 inches freeboard. Two people could be carried tandem fashion. It was driven by a 14 horsepower, two-cylinder light motor, and

come to some general facts about the construction of the hull that are not as yet so well known.

In general, the form of construction used is much the same as in other forms of speed boats with certain minor differences due to the peculiar shape of the hydroplane. The main consideration in building a hull of this sort is longitudinal stiffness. Considering how little of the hull actually touches the water when a boat of this sort is going at speed, it is seen that the hull actually forms a bridge supported at the steps. It may be seen, also, that in a hull of given length the distances between the points of support will vary inversely as the number of planes.

Thus, the biplane hull will have the supporting surfaces more widely separated than the two-step boat, and so on, till we come to the multiplane type, such as Disturber and Pioneer, in which the points of support are very close together. In the opinion of the writer these boats are in reality more like monoplanes in their action than like the other forms of step hydroplanes.

In addition to the fact that the hull is supported on several very small areas, it must be remembered that when driven at high speed in rough water there is bound to be considerable pounding, particularly in the smaller size hydros, say up to 25 feet overall length. In fact, the writer has seen a small 14-foot boat doing around 30 miles an hour repeatedly leave the water entirely when driven hard in

gine rather than in the hull. A light engine in a comparatively heavy hull will give far better results than a heavier engine in a very light hull. The reason for this is that it is important to keep the weight distributed, which is hard to accomplish when the engine is by far the heaviest portion of the load to be carried.

A good example of this is the two-step 20-footer, raced the latter part of this season, called the Breeze I. This boat, although weighing complete in racing trim 1,650 pounds, carried an engine weighing only about 300 pounds. This engine was the smallest in point of bore and stroke at the Huntington Regatta, while the boat was the heaviest but one of those of 20 feet or under. This boat has two longitudinal trusses running her full length, and the engine beds are of two-inch oak 8 inches deep, extending for 8 feet fore and aft. In spite of her speed nothing has ever loosened up nor is such a thing likely to happen.

SEAWORTHINESS, HANDINESS, ETC.

CONTRARY to the general opinion, the small hydroplane is no whit less seaworthy than the ordinary type of small motor boat, and when it comes to a choice between the light, narrow, cranky displacement racer of the last few years everything is in favor of the hydro. An average speed of nearly 25 miles an hour from Gravesend Bay to Hell Gate in a 14-foot boat could not be



A fast 14-foot hydroplane designed by Breeze Bros. and built by W. A. Aylor at Bromley, Ky., for Mr. Geo. M. Sterns, of Cincinnati. She is driven by a 24-h.p. Fox aeroplane motor and has nearly touched the 30-mile mark.

possible in a hull which from its form was essentially unseaworthy, regardless of the excellence of the construction and the material which entered into it.

ment boats which turned back at the first mark, while Gunfire, Jr., and Breeze I, both hydros, completed the round, and were ready to continue when the committee called off the

that the boat was at no time during the round in the slightest danger, and, in fact, had run all the way across the Sound from New Haven two days before under the same con-



Tequilla is a good example of the multiplane. She is an Elco-built 32-footer of the Fauber type powered with a 60-h.p. Elco motor, and it is claimed that she has attained a speed in the neighborhood of 30 miles an hour.

During the second day's racing at Huntington, when the small boats were sent over the long course and the outside leg was extremely rough even for large boats, it was the displace-

ment boats which turned back at the first mark, while Gunfire, Jr., and Breeze I, both hydros, completed the round, and were ready to continue when the committee called off the

dition of wind and sea.

The ease of control of the small hydro when properly designed is something absolutely undreamed of by the man used to the



Breeze I, also one of the Breeze designs, is a two-step hydroplane or triplane 19 feet over all. She is quite heavily constructed and has proved her ability to withstand the thumping of a moderate sea.

cranky displacement racer. Although a little has to be learned in regard to driving, the pilot can very soon make turns and evolutions which would have sent him straight to Davy Jones had he used his helm in such an apparently reckless fashion in a displacement craft.

There is none of that unpleasant and dangerous rolling outwards when the helm is thrown hard over, which, by the way, may be done at full speed, that is experienced in the displacement boat. Instead, the boat tips naturally toward the inside of the turn and may be swung around with a properly proportioned and placed rudder in a surprisingly short circle. The action is similar to that of the aeroplane under similar conditions, and the more the boat can be heeled over the sharper will be the turn.

The first 20-footer built by the writer could be steered for miles, and all but the sharpest turns made without touching the helm at all. This was done simply by throwing the weight of the body to one side or the other. This boat, which carried the engine in the stern and

drove the propeller with a chain gear, was particularly well balanced in this particular, due to the position of the motor and propeller, which was just forward of the motor and pulled instead of pushing the boat, as is the usual practice. This boat, by the way, did 22 miles with an engine developing 24 horsepower, turning at 850 R.P.M. and weighing over 600 pounds. It might be well to add, however, that it probably would not have done so well had the engine and propeller been placed in the conventional manner.

In further defence of the extra expense and complication involved in the construction of a boat in this manner, the absolute freedom from any noise or vibration when sitting in the forward part of the boat is absolutely marvelous; the passenger came as near the sensation of a bird as is possible till someone supplies us with a motorless aeroplane.

AS A SPORT.

A SIDE from the general handiness of the small hydro, the sport of hydroplaning is a joy which the motor boat bug has yet to dis-

cover, but when he does, the sight of small boats doing 25 miles an hour will be as common on the water as the small runabout automobile is on land. The sensation of speed is infinitely greater than in the displacement boat, and when you have the comfort of stability and room permitted by the greater beam of the hydroplane the reasons for the objection of many people to the speed boat are entirely done away with.

The small hydro can be absolutely dry at any speed, except in the strongest winds. This, of course, is due to the fact that the boat is going over the water. It is this characteristic of the hydroplane which gives the passenger in it the feeling of sliding over something solid, comparable only to the sensations of a fast toboggan slide or a continuous "shoot the chutes."

Passing now from the purely sporting aspect of the hydroplane, the question arises as to what practical value the principle will have. In other words, what is the limit of size of a boat which may be successfully built on the hydroplane principle. One prominent de-

Buying a Motor Boat.

A Discussion of Certain Questions of Design That the Inexperienced Motor Boat Man Should Take Into Consideration When Deciding Upon His New Craft.

By E. T. Keyser.

HAVING a boat built, and buying a boat are two distinctly different propositions. In the first instance, one is likely to get what one pays for, and any particular advantages in the way of construction, finish, speed and comfort are all accounted for in the bill.

When, however, one tackles the boat market, whether for a new or second-hand boat, there is always the alluring prospect of securing a great deal for an expenditure of a very moderate amount of cash. The average second-hand boat generally is a bargain, but whether the bargain is on the buyer's or the seller's side of the ledger depends pretty much on how much knowledge of boats is in the possession of the buyer or the buyer's friends.

Now, there are certain points in regard to boat buying, whether new or second-hand, such as material, construction, model and the actual condition of the boat itself, that can be no more imparted by printed instructions than the arts of swimming, boxing and fencing. On these points it is best for a novice to take the advice of a boating friend; but there are other matters in which the novice is capable of judging for himself and, by thus eliminating a lot of impossible deadwood, reducing to a minimum the number of cases in which he will be obliged to ask advice.

THE OPEN BOAT.

SUPPOSE, for instance, you are in the market for an open boat. If the cockpit is so arranged that you and your guests cannot move around without stepping over exhaust pipes and wiring, you might just as well pass it up at the first glance.

Take particular note as to whether one man can really handle her. By handling I don't mean setting the spark and throttle and then going forward to a wheel to steer her indefinitely on a nice bit of open water. I mean: is she so laid out and arranged that you can run her up to a dock or mooring, slow down the engine, stop and reverse her as desired, and go ahead again without running from one end of the boat to the other? If you cannot do these things you are going to get up against it bad some day.

It may be that a boat may, at a moderate expenditure, be arranged for one man to control, but it is a great deal better plan to secure from the owner a figure at which he will agree to make these changes, should you

decide to purchase, than rely on an alluring statement that it will only require a very small amount of money to do the work, as there may be hidden obstacles in the way of hull construction, steering gear and engine installation that would cause the job to prove much more expensive than a casual inspection on your part would lead you to suppose.

Has she plenty of locker space? You will need stowage facilities for oilskins, tools, anchor and cable, oil cans, scrubbing brush, scrub pail, mop, wiping cloths, cotton waste, extra spark plugs and a hundred and one things that you will really need to keep both boat and engine in condition, to say nothing of the lunch baskets, thermos bottles, sweaters and bathing suits that will make the cockpit look like the bargain counter in a hock shop, if you don't keep them out of sight.

And when you come to measure up the locker space just keep in mind that there are two varieties of side locker. The desirable kind is the locker, the bottom of which is the extended side of the cockpit floor, which will allow you to use it for storing square packages and which will really hold something. The other and less desirable kind is that in which the locker front comes right down to the side of the boat, giving a triangular cross section with a lot of waste space in the bottom. While this is a necessary evil of very narrow craft there is no excuse for it in boats of five feet, six inches beam, or over.

Now, let us take a look at the engine installation. Is it so set in the boat that you can drain the cylinder base, remove the hand-hole plates, and get at any part of the engine or clutch without tearing out woodwork?

Is the gasoline tank so installed that it may be removed without tearing out lockers or fixed bulkheads? Are there any right angle turns in the exhaust pipe? Is there any reduction in the size of the exhaust pipe between the engine and the muffler? Right angle turns and reduction in size of the exhaust piping cause a back pressure on the engine and reduces its revolutions.

Examine the propeller and see whether it is bored cylindrically or tapered. If tapered, all right; if not, there is a chance that, some day, the thrust of the wheel will send it forward up against the boat, bending the blades, and possibly loosening the stuffing box.

Perhaps the boat, so far as hull is concerned, is all that you desire, but it is necessary for

you to have a larger engine installed. In this case, make sure that a new engine may be so installed as to retain the present angle of shaft and if the boat has a deadwood, that this deadwood is sufficiently thick to allow the boring for the diameter of shaft which you will require, and also be careful to ascertain by actual measurement if there is clearance for the diameter of wheel that the new engine will take.

If the boat is not equipped with a reverse gear, or reversible propeller, be careful to ascertain that there will be clearance for the installation of the first and for clearance of the lower portion of the lever, or sufficient material in the deadwood for re-boring for the sleeve of the latter.

For salt water use there is no comparison between a bronze rudder and skeg and one of galvanized iron. With the latter there is always more or less electrolytic decomposition induced by the action of salt water on the galvanized iron reacting on the bronze propeller fittings to the detriment of the latter. A quadrant on the rudder post is much to be preferred to the ordinary straight tiller. With the former there is no alternate slackening and tautening of the steering cable, as is the case with a tiller, and there is nothing more annoying to the steersman than this loosening or play in his gear.

See that the sleeve or pipe in which the rudder posts sets comes well above the water line, as otherwise considerable water may be taken in through the top of the pipe, unless equipped with a stuffing box.

CONCERNING CABIN CRAFT.

MOST of the points noted above apply equally well to the selection of a cabin craft, but in addition the accommodation problem looms up. The temptation to become the owner of a cabin cruiser is so strong that it is responsible for the building each year of a number of very diminutive cabin craft that would far better have been finished off as open boats.

After one season's use the skippers thereof realize their mistake, and either return to the open boat, or secure something larger, according to the state of their bank accounts. That's why so many bargains in twenty-five to twenty-eight-foot boats are advertised every season.

When a man goes in for real cruising and

proposes to do that cruising in a cabin boat, it's bad weather of which he must take account. When the sun shines and everything is lovely, the real living, the eating, a considerable proportion of the cooking and most of the sleeping can be done under shelter of the cockpit canopy. But when you get a solid three-days' drizzle and everything is muggy, misty and damp there is mighty little joy in making up the table, making up the beds, and eating one's meals amid a conglomeration of blankets, oilskins, and odds and ends of clothing.

Any man who has ever rescued a suit of store clothes from the locker, underneath the berth, after they have sojourned there during a period of four rainy days, understands why a full length clothing locker, running from the cabin floor to the cabin roof, appeals to the seasoned cruiser, and the luckless individual who has been obliged to tack asbestos over the galley stove, to buy ice in ten-cent chunks for the refrigerator, store most of the grub inside lockers, and take down the toilet room bulkhead when he wanted to get at the inwards of his engine, has a hearty appreciation of the truth of the axiom that two objects cannot occupy the same place at the same time.

So, before you fall for the alluring bargain offered by the gentleman who is about to order a larger boat, sit down and offset the charm of the electric-lighting equipment with a problem of where you will keep the frying pan, and that unhandy bottle of spring water. The seductiveness of the nickel-plated fixtures of

the forward toilet room in a twenty-six-footer is apt to lose its lustre when one tries to figure out how to enter therein, when the extension berths are spread across the cabin.

Before you part with your hard-won wealth for a diminutive-raised deck cruiser because she has a lavatory, a state room, engine room with a stove and refrigerator and space in the cockpit for two wicker chairs and a megaphone, sit down and figure how much food three healthy men will eat in four days, how many clothes they will bring aboard with them, how much ice it will take to keep the meat and other perishables from going bad, what utensils you need to cook with, and how many dishes the table will require, and then figure out just where you will stow them so that nothing will have to be moved more than once a day to get at something else, and the amount of cabin space and storage facilities that a very moderate-sized party requires on a very short cruise will begin to dawn on you.

If you have any doubts on this subject just look back and consider the tendencies as shown by the last few motor boat shows. It wasn't so very long ago that the best and biggest builders in the country exhibited boats that were cut up into any number of compartments, and the builder who could show the greatest number of pigeon holes on a given overall length figured that he had captured the bun most liberally sprinkled with the currants of public approval.

In the 1911 show the boats were the same size and even larger, but the number of cabins had been cut down and the size of each in-

dividual compartment increased until it was possible for a man to put on his shoes without opening his state room door and to brush his hair without endangering the mirror in the toilet room.

Three years ago a friend of mine ordered a twenty-six-foot open boat. The builder, for very little extra, offered to make a raised-deck cruiser of her, but did not succeed in tempting him. Another party, however, who ordered the same model hull grasped the proposition with avidity, and within a month after his boat was launched offered to swap boats with the owner of the open craft and pay something to boot.

In the purchase of a cabin cruiser, fuel consumption is a pretty important item. It is not only a question of how much gasoline the boat will require at from twelve to thirteen cents a gallon, but as to the length of her cruising radius without the necessity of refilling.

There are times when a few gallons' capacity of tank or a couple of hours more leeway in time, will allow one to pass by the eighteen and twenty-cent pirate and fill up at the tank of a dealer who doesn't expect to cover all his monthly expenses out of the first three days' business. Twenty gallons of gasoline at thirteen cents is two dollars and sixty cents, the same quantity at twenty cents a gallon comes to four dollars, so that other things being equal a boat with a tankage sufficient to make one independent in the selection of supply stations possesses great advantages.



Cooter—A Power Duck Shanty.

COOTER is the name of a power gunning shanty designed by Arthur P. Homer for J. L. Sturtevant, of Boston, as a boat which he could use on hunting trips throughout the winter months. A very strongly constructed hull was required as the owner frequently runs his boat up on the gravel bank and leaves her over the tide, thus necessitating a strong hull to withstand the pounding. She is planked with white oak, $1\frac{1}{8}$ -inch thick, and her frames are 2 inches square and 10 inches center to center.

The little boat is very beamy for her length of 33 feet, for she has a width of 9 feet 1 inch. Her greatest draft is 2 feet 11 inches. She is

A Thirty-two Footer Designed and Equipped for Winter Duck Shooting.

equipped with two 15 h.p. Sterling engines of the heavy-duty type, which drive the boat at a speed of 10 miles per hour. Besides her liberal beam, another interesting feature of Cooter is the very heavily constructed 6-foot hatch, which is left open at all times, except in the worst weather, so as to give a thorough ventilation to the interior. This hatch is covered with a standing roof so that in rainy

weather it may be possible to leave the cabin open. Upon the standing roof are khaki curtains with isinglass windows. In spite of her short length Cooter is an able sea boat. With her watertight cockpit and seaworthy design, she will live in a sea that would endanger many a boat twice her size.

The finish of the boat is in butternut and she is provided with accommodations for Mr. Sturtevant and three companions. She is equipped with electric lights and Edison storage batteries, Holtzer-Cabot dynamo, and everything about her is in accordance with the best yacht and no expense has been spared to make her one of the finest boats of her type.

MR. FAUBER ON HYDROPLANES

IN the January issue of MoToR BoatinG, Mr. Fauber, the designer of the pioneer of successful hydroplanes, will discuss the multiplane. There has been a lot of discussion of late on the relative merits of the monoplane, the biplane and the multiplane, frequently to the disadvantage of the latter, and Mr. Fauber's ideas on the subject will be intensely interesting, as they present the other side of the question.

The article "How To Build a Hydroplane" and the first of Captain Howard Patterson's articles on the instruments used in navigating a motor boat and how to use them, also will be features of the January issue.

The New 84-Footer, Bettina III.

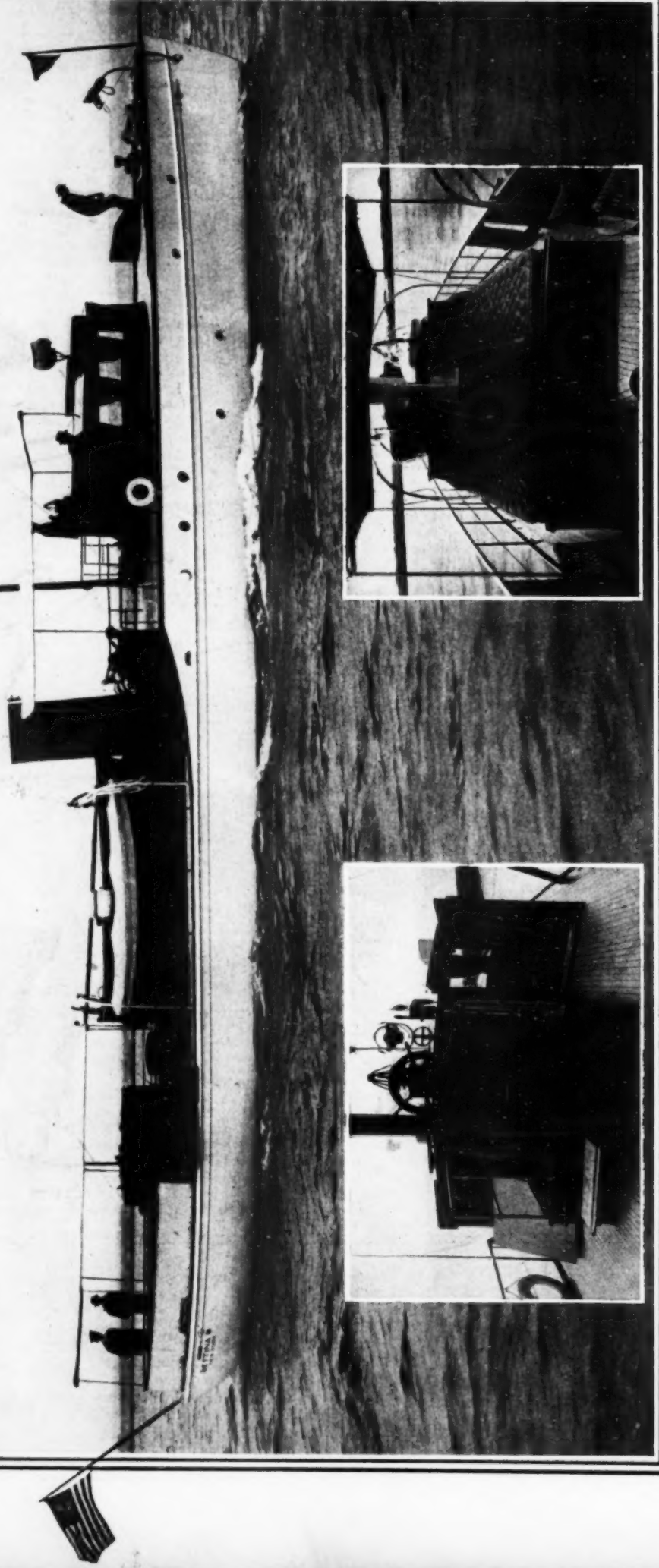
THE new 84-footer, Bettina III, was designed and built by the Electric Launch Company of Bayonne, N. J., for F. G. C. Lyon, Esq., of the New York Yacht Club.

The engine room, directly aft of the crew's quarters, is separated from the forward and after quarters by watertight bulkheads. This

room is unusually large and in it is installed a 100 horsepower, six-cylinder, air-starting and reversing Standard engine, which gives the yacht a speed of 14 miles an hour. The gasoline is stored in two large copper tanks, holding a total of 450 gallons. An electric light plant is also installed in the engine room, and this is directly connected with air, water and

The highest grade of construction was employed throughout the hull, with oak keel and frames, selected long leaf Oregon pine planking, fastened to the oak frames with copper nails riveted over washers. The fastenings throughout the hull are of copper and bronze to withstand the corrosive action of salt water.

The outside trim of deck houses is in mahogany, the cabin being enclosed with plate glass windows that can be



Bettina III, an 84-foot Elco cruiser built for Mr. F. G. C. Lyon, of the New York Yacht Club. She is shown starting on a trial trip with decks cleared for action in anticipation of the rough water to be encountered "outside." Note the interesting arrangement of the bridge deck and the comfortable divan seats on the after end of the cabin trunk.

What Does a Naval Architect Do?

By Morris M. Whitaker

A FEW years ago the writer went back to the little town in Northern New York where his boyhood had been passed, and an old lake captain who had known him since his knickerbocker days asked the question that heads this story.

It does not do to put on "lugs" before those who know your history from the time you started to learn to read and are well acquainted with all your youthful escapades and shortcomings and who wonder how the kid who used to swipe apples and steal gates on Hallowe'en can go to the big city and do things.

This particular old captain had sailed the lakes since boyhood—had built and owned schooners and at last had been forced into retirement by the modern lake freighter. He was typical of his class, a class rapidly disappearing, but one to which many of us of the younger generation owe more than we can ever repay. He had taught me many things that cannot be learned from books; things that sometimes one forgets till the emergency calls them to mind. He was self-taught by experience or by his predecessors and did not understand modern technical educational methods. When he wanted to build a new boat he went by experience and judgment. He did not understand such a "high-follutin" title as Naval Architect. He knew it had something to do with boat building but just what was a mystery.

Under such conditions it was up to me to explain, to show to an old friend that the title I claimed really meant something and that my life's work was really worth while and of some use to my fellows. It had to be a "heart-to-heart" talk, more personal than I wished, as this story must also be, as personality pervades everything and every walk in life and one can only generalize from his own experience.

There are many others who do not understand what a Naval Architect is and does, for it is a comparatively new profession. It is simply the result of the modern tendency toward specialization. There have always been Naval Architects, ever since the first boat was built, but they were not known by that title. The Naval Architect is the planner of the boat, the man who sees the boat in its entirety before even a stick is cut or a nail driven. He is the creator, he forms the mental picture, plans it in detail, works out the idea on paper or in the loft, and finally sees it grow into form in wood and metal, till it takes the water. The boat is the child of his brain and how well it succeeds in its purpose depends on how well he knows his business and how carefully he has thought out its detail. His work in one way is like the artist's, the engineer's or any of the creative professions. He may not be recognized, but in all construction work someone plans it before it can be executed.

The man who fashioned the first dugout from a log was a Naval Architect. He tried it and possibly it capsized. Then he reasoned out why and his next attempt may have been better or worse. Thus he gained knowledge. Others were doing the same. They swapped information and thus experience accumulated. Through the ages each community or people has developed its types. As knowledge increased, the latent love of adventure lengthened the voyage. One race or people mingled with another; they learned from each other; knowledge of the subject widened. Other arts and crafts were called upon for aid and among these mathematics was called on to give reasons for results and to predict future results. As early as the fifteenth or sixteenth century boatbuilding was becoming an exact science and its craftsmen became a guild or association with trade

secrets and systems of training and apprenticeship, which flourished and became of great importance.

In fact, we are today using practically the same methods of mathematical deduction that were thought out by those early Naval Architects of the guild. The guild served its purpose and like every human institution disappeared into oblivion, but its work remains in the results. While motive powers change and improve, the principles of design so early recognized and reduced to a science are the same today as then, whether applied to a row boat or an "Olympic," but the training of the workers has changed with the age and circumstance. Modern educational methods in naval architecture follow the accepted line of training in other professions—the technical school or college, where the aspirant is drilled in principles and put through a course in the mathematics of the subject, supplemented by lectures on forms, construction, and methods, and punctuated by actual designing work and calculations of one or more problems.

At the same time the student is required to get a thorough working knowledge of allied subjects, such as steam engineering, electrical engineering, hydrostatics, strength of materials, etc., till at the end of his four-years' course he emerges from college at his commencement (of life) with a head full of facts and theories which it will take him years to digest, arrange and forget. He is like every other college graduate—long on theory and mighty short on experience, either of the world or his chosen profession. He must get experience, even if he has been fortunate enough to have accumulated some before entering upon his studies. The young naval architect is like the young doctor or lawyer—open for practice—but his youth and inexperience are against him and he must become a "cub" in some shipbuilding plant, earning less sometimes than the office boy, but awaiting his opportunity.

Opportunities do not come to all alike, nor does experience, but after being the "mop" for awhile some opening will appear which leads to better things. In these apprentice days, so to speak, the college-educated man is testing out his theory by actual practical reasoning from cause to effect and adding each experience to his general store of accumulated knowledge, testing and trying new ideas and fitting himself to take advantage of opportunity when it knocks at his door, and every day in every problem presented for solution, opportunity to make good comes to him.

It is best to pass over these "under-dog" days. Every man goes through them, but there comes a time when the future naval architect feels strong enough to fly for himself, for he must either fly or become an unknown and unsung part of a machine, but if he does try it alone, his troubles are only commenced. He must get an office, hang out his shingle and wait and hope and struggle for recognition. He must make good, must make a living or go back as part of the machine. Prudence teaches modesty in his start, but even at that the expense of maintaining an office is great and he cannot sit down and wait for clients like a doctor. He cannot hide his light under a bushel—he must make his knowledge and experience count. He must go after clients; he must show them what he can do for them. He must have qualities fundamentally opposed and which are seldom found in the same personality; he must be an artist and an artisan, a dreamer and an executor; he must have an extended and intimate knowledge of kindred arts and trades, and he must study constantly to keep abreast of and even ahead of current practice, but first of all he must figure out for himself what particular branch of naval architecture he proposes to

follow and then must dig at that first, last and always, before he can become a specialist and win success. He does not get his title with his college diploma—he must work for and earn it. His profession is constantly enlarging in scope and hence requires and develops a specialist. Like a young doctor, clients come slowly, but his work and personality have a good will value which is constantly growing as the years go by and age and experience increase. To use the medical simile again, one type of boat can absorb all a man's time and effort as the study of and practice on only one organ of the body can require all a medical practitioner's time.

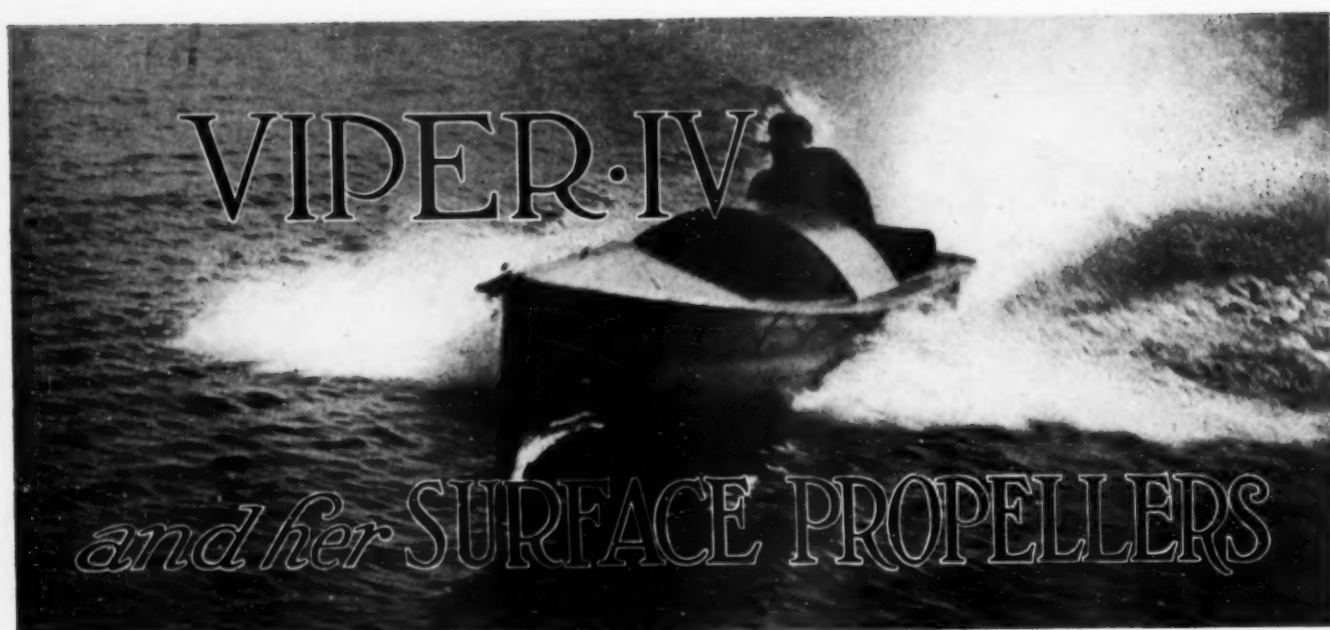
A man might be the best designer that ever lived but if he could not get a chance to show what he could do, could not get work—his talent is wrapped up and put away. What can he do with his knowledge and experience? Just what any other specialist does—put it at the service of those who can use it to advantage.

The general run of men who use and want boats have little or no technical knowledge of them. They are dependent on someone to guide and advise them. The Naval Architect occupies the same relative position today as the doctor or lawyer, and gives for a professional fee the same character of service. He has nothing to sell but ideas and experience and if he is honest and conscientious, acts only with his clients' interests in view. He gives unbiased advice and is a free lance who is employed by and acts for the owner. He sells to anyone that can use it, the results of his experience.

If you want a new boat, it is his business to plan it out to suit you as nearly as possible; to design the boat so that it will look right and act right; to give it the tone and appearance which is pleasing to the eye and which does not violate all the canons of good design; to play the part of an artist, in fact, so that your boat will be a pleasing picture instead of a cheap reprint production; to produce that indefinable quality which goes under the slang term of "class." This is where the artistic side of the naval architect shows up. At the same time he must so plan and form the hull and distribute its weights and buoyancy that it will act well in its native elements, that it will be as speedy and comfortable as possible and not roll around like a log. This is where the architect's experience counts, and the more boats he has designed, tried out and been to sea in and the better he has reasoned out the results of his previous experience, the better he can fulfill these conditions.

Sometimes you may want something which will not work out in practice as you expect. It is his duty to tell you so and why. If you want to be relieved of all detail it is his business to act as a go-between between you and the various trades and industries whose work enter into the boat or some part or fitting. It is also his business to recommend to you the type but not the make of motor suitable for your boat. It is his business to design the boat so that it will do what you want, get estimates from builders, draw up a contract between you that is fair to both, to watch the work while in progress, see that it is properly done, try the boat out when completed and see that it is delivered to you as called for by the contract and specifications.

If you want to buy a boat already built, the naval architect can help you. He can make what is called a survey of hull, machinery and fittings and report to you whether or not it is as represented. If you want a boat altered he can plan and execute the alterations. If you want a new motor, outfit or fittings, he is ready to give you his best service. In fact, in anything connected with a boat, the naval architect is *your man*.



WE have been so long accustomed to screw propellers that a short introductory explanation of why the surface propeller was devised may be in order. In a modern speed boat, driven by a screw propeller, and especially in a hydroplane or gliding boat, one of the chief resistances dealt with is the dragging through the water of the shaft, strut, rudder, and the inefficient parts of the propeller itself. This is because water is extremely "hard," so to speak, at high speeds. In fact, an expert swordsman in trying to cut into a stream of it from a high pressure nozzle, will shatter the sword. As Linton Hope put it in the *London Motor Moat*: "At such a speed as 49 knots water is practically inelastic, and is to all intents a solid body. It is so hard, that is, its inertia relative to the speed of a hydroplane is so great, that it will not give way while the boat is passing over it, but remains almost as rigid as ice and carries her out on its surface. The only parts of the boat that may be said to really pass through the water at very high speeds are the shaft, outboard bearing, strut, propeller and rudder, and of all these only the outer two-thirds of the propeller blades are working parts, the rest having to be dragged through by them. The average man will not realize how great this resistance may be, and it is worth citing an extreme case to bring it home. In one or two of the little *Ricochet* French hydroplanes, which are very light and have attained very high speeds, the pressure of the water against the sloping shaft has been so great at speed that the little boat has been lifted up by the stern and tilted over on one side. In an ordinary racing hydroplane, shaft and appendage resistance may amount to between 20 and 30 per cent."

It was in an effort to do

away with this resistance that an experiment was tried by Mr. Hickman, who, with Mr. Sanford Munsie, was co-designer of the now famous low-power type Viper. The idea as carried out in Viper IV was to hoist the propeller shaft, boss, strut and everything out of the sea, putting the shaft out through the stern of the boat, so that the boss would be above the surface with the boat at speed with only the more efficient parts of the blade engaging the water. As more than half the

wheel was therefore out of water, a propeller of much larger area was used than would have been with the screw propeller system; while the side thrust with only the lowermost blades immersed, required the use of two wheels running in tune, in opposite directions, in order to obtain the best results.

The experiment was tried and was an entire success, though, instead of a light hull with high power being used, only a comparatively heavy hull with low power was available.

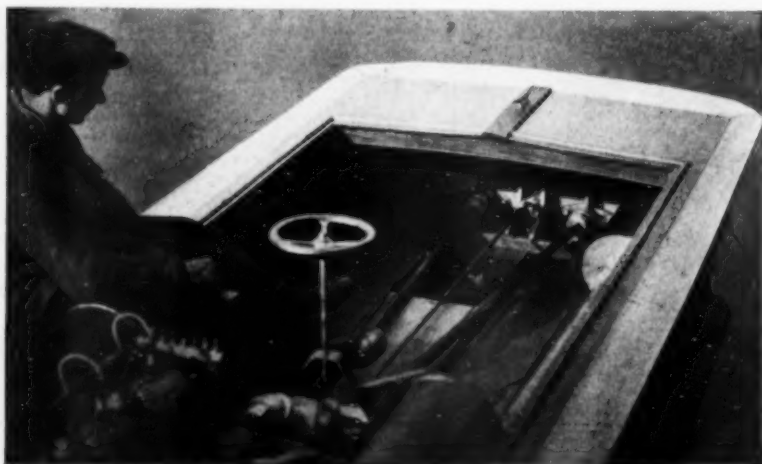
A 17 h.p. Ferro engine crudely installed in an old experimental Viper hull, with the first pair of surface propellers used, gave a speed of about 18 miles, with a propeller slip, at full speed, of only 7 or 8 per cent.

The boat had a total draught of water, when running, of barely 12 inches, or half the draught of a screw propeller speed boat of the same size and power. In her first trials she was put through heavy floating beds of eel-grass, and it was found, as was to be expected, that she was entirely weedless, and further, that no weed growths that were available seemed to affect her speed in the slightest degree. The weeds did not wind about the shafts because there were no shafts to wind about.

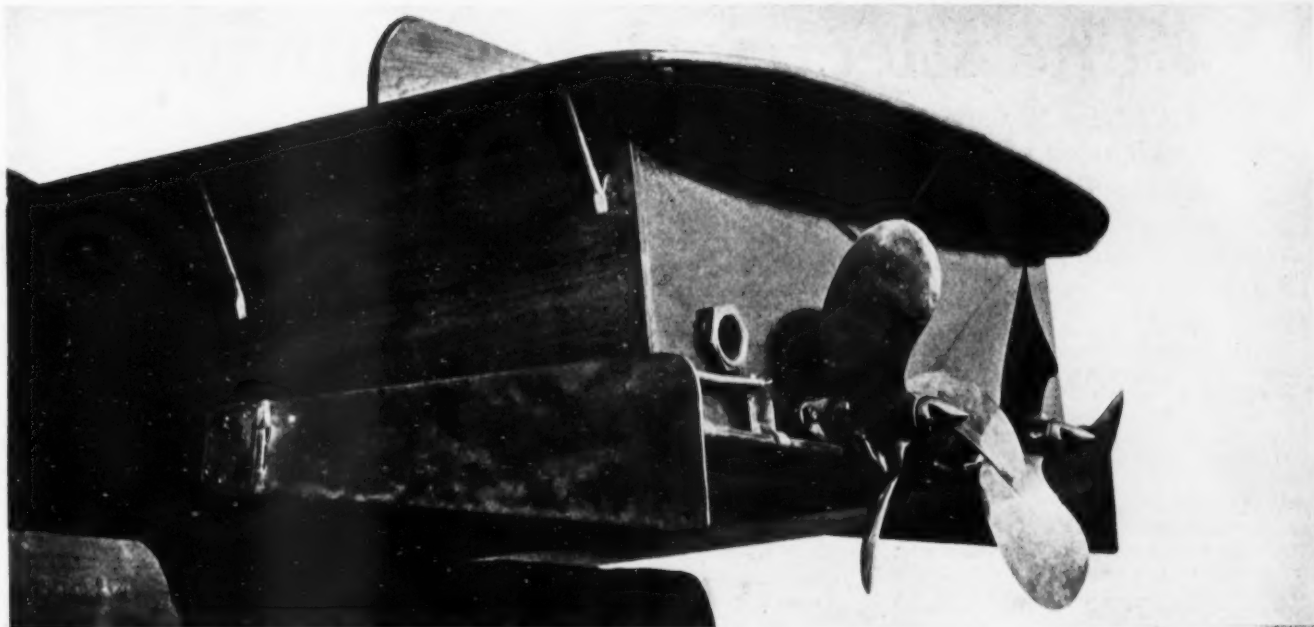
Viper IV came next. This type is in no way intended to supplant the Viper III type (low-power Viper) which, with low power and a screw propeller is considerably the faster boat. In this new class of boat, of which Viper IV was the prototype, the hull was designed by Mr. Hickman and Mr. Munsie for surface propeller work, and to carry the machinery weights far aft. It is a monoplane in form, is fast, dry and seaworthy. The breadth of beam is a little more than one-fifth the over-all length, giving a wide, roomy, and very stiff craft. The total width over spray boards of a 22½-foot boat, the size illustrated, is about 5 ft. 7 ins.



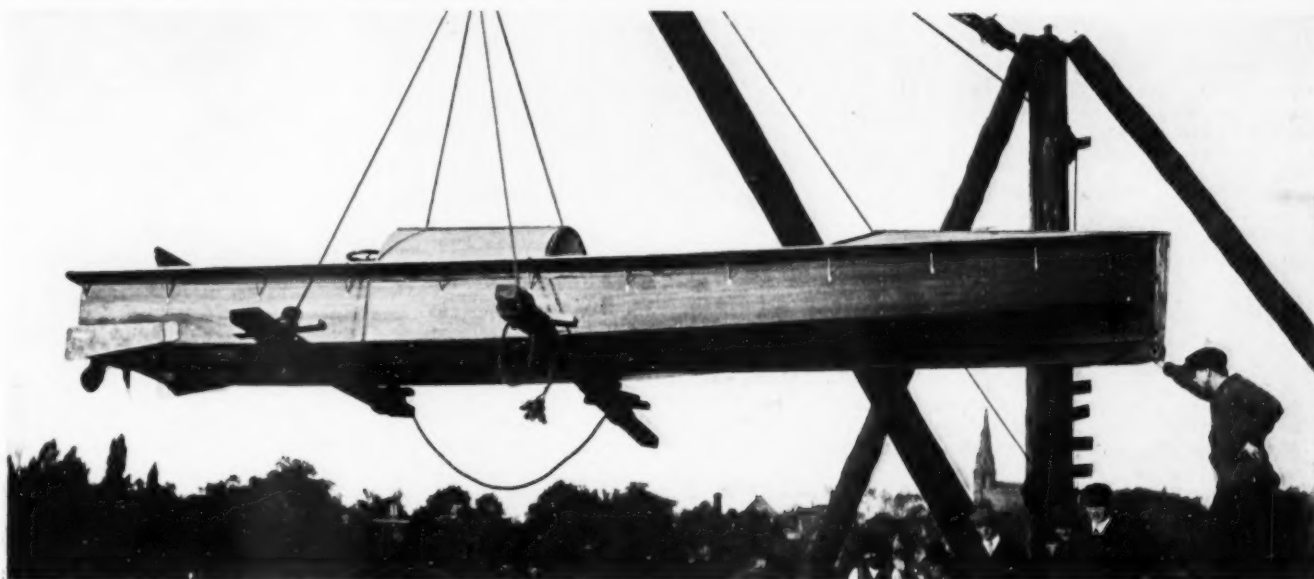
In turning, only the rudder on the side of the boat to which the turn is made is used and this is held away from the hull by the shaft shown above. Note the springs for holding rudders in place when backing.



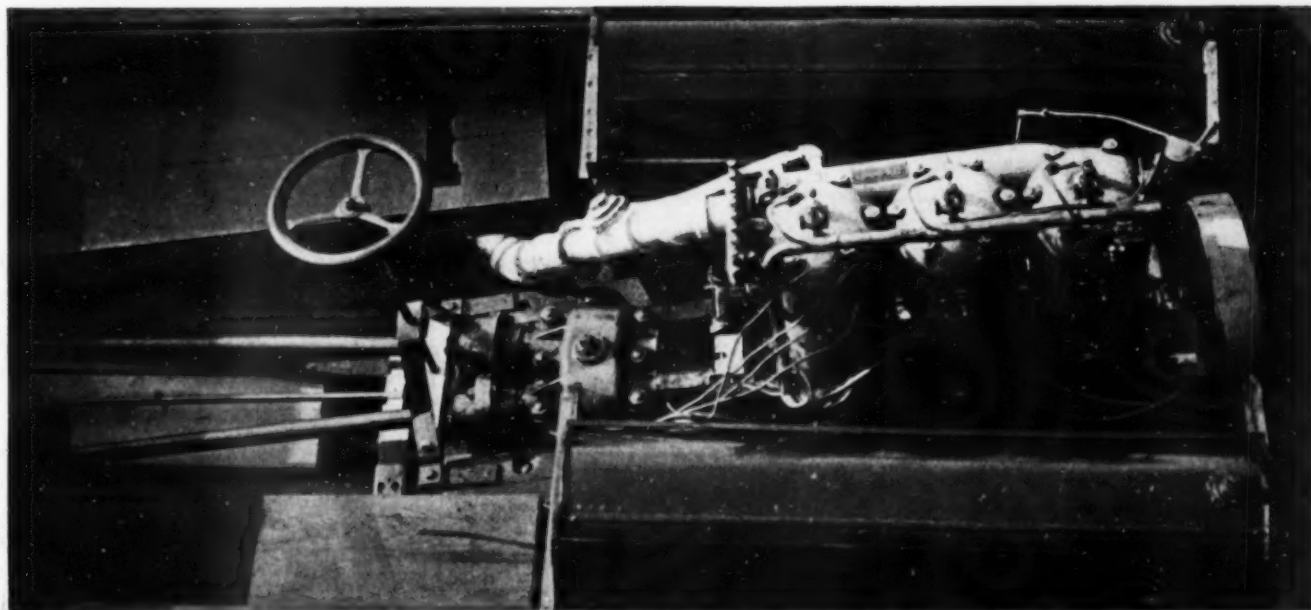
The stern bearings for the twin shafts. The small central shaft terminates in the pinion shown in the upper illustration, working in a rack cut in the shaft for the rudders.



Viper IV's surface propellers and side plate rudders patented by Mr. Hickman. The propellers required are somewhat larger than submerged propellers for the same service, and this fact seems to limit their application to comparatively small craft.



The new Viper is built on monoplane lines with V sections forward instead of the square sections of her predecessors.



The Ferro engine with housing removed and special transmission also supplied by the Ferro Company. Note the slight inclination of the motor compared to that of the usual installation, and the position of the gasoline tanks on either side of it.

The Electrical Equipment.

A Concise Explanation of the Electrical Apparatus Used for the Ignition and Lighting of Motor Boats with Descriptions of the Working of the Various Parts and Suggestions for Their Arrangement and Wiring.

By C. Peterson.

SINCE it is now definitely fixed that about ninety per cent. of motor trouble is the result of faulty ignition and the attendant apparatus, it follows then, axiomatically, that the electrical equipment requires intelligent care. Yet there are not a few ardent followers of the sport whose intimate knowledge of their power plant consists of turning on the oil, spark, gas and turning the motor over—all of which tends to make the motor mope—perhaps. For these "not a few" let us start the paper with a few of the rudiments.

UNITS OF ELECTRICAL MEASUREMENT.

The chief units of electrical measurement are the volt, unit of pressure or electro motive force; ampere, unit of quantity; ohm, unit of resistance.

The relation of these units is shown in the law: One volt is the electromotive force (E.M.F.) that will cause a current of one ampere to flow through a resistance of one ohm.

SOURCES OF CURRENT.

Electrical current used for ignition is obtained from two sources: chemical, under which head come primary and secondary cells, and mechanical generators.

Under the first group we have the lowly dry cell, the liquid Edison cell, and the various forms of lead plate storage cells. Under mechanical generators come the dynamo and magneto. These are practically alike, the difference of which will be shown later.

The typical dry cell (Fig. 1) consists of a zinc shell or can (one of the elements), having a lining of some absorbant material, generally blotting paper. This paper is saturated with a solution of sal-ammoniac and zinc chloride which form the electrolyte. In the center of the can is placed the carbon element, just below which is a layer of clean dry sand. The sand keeps the depolarizing mixture, gen-

erally carbon and oxide of manganese, from contact with the zinc element. A sealing compound on top of the depolarizer completes the cell, excepting the binding posts.

The one great disadvantage of dry cells is that one never can tell when they will give out, not knowing how old they were when

copper oxide plates, suspended in an electrolyte made of caustic soda; all of which is held in a porcelain jar. One set of elements will last an entire season in the average boat. Curves showing the output of this type of cell read practically constant, and at the end show a sudden drop; this means that as long as there are any of the elements left there is full service in the cell.

CONNECTING CELLS.

Before leaving batteries, a few words on the connection of the cells to form the battery:

Connecting cells in series (see diagram) increases the voltage in the circuit and is accomplished by connecting the positive and negative posts of the cells together. This is the common every-day method of "hooking-up."

Connecting in parallel has the effect of increasing the size of the elements, but only giving the voltage of one cell with a high amperage. In this case all like poles are connected together.

By combining the two systems (series-parallel or series-multiple) the effect is to get the voltage of the units in series with the large current of the parallel. Connect two sets of series so that the end poles are tied together.

In other words, *series for pressure, parallel for quantity and series-parallel for a combination of both.*

THE STORAGE BATTERY.

Any voltaic couple that is reversible in its action; that is, tends to return to its original condition, forms the base of a storage or secondary cell. The chemical action is first caused by the passage of an electrical current, after which electrical current is given off as a result of the reversed chemical action.

The majority of modern storage cells are

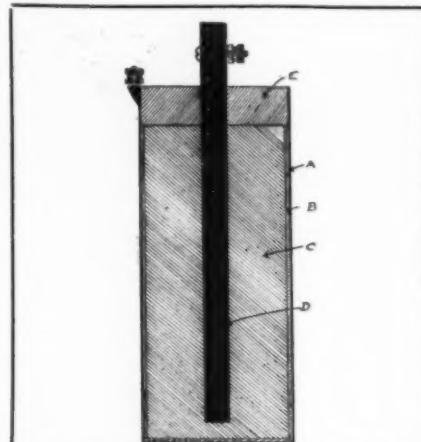


Fig. 1—Section through a typical dry cell.
a. Zinc shell. c. Depolarizer.
b. Lining saturated with the Electrolyte. d. Carbon.
e. Sealing compound.

bought. Their wonderful recuperative powers deceive even the experts. There is one thing to remember when buying dry cells: Don't take the ordinary kind, except in an emergency. Get the kind made for ignition purposes. The ordinary cell and the ignition cell are made for entirely different classes of service.

The Edison primary cell consists of zinc and

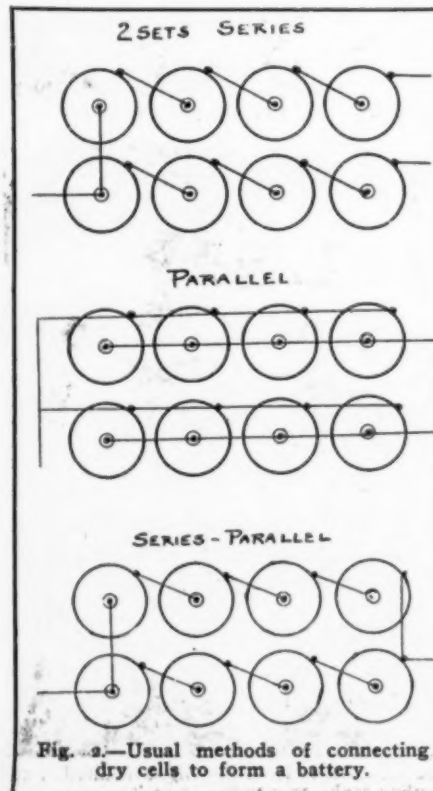


Fig. 2—Usual methods of connecting dry cells to form a battery.

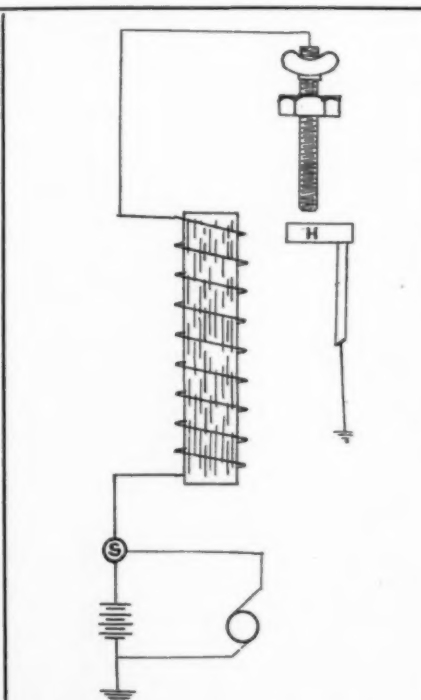


Fig. 3—Low tension make-and-break circuit diagram using either dynamo or magneto as the mechanical producer.

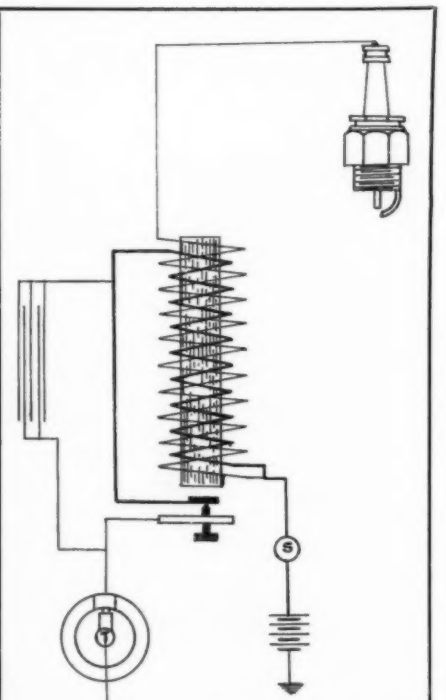


Fig. 4—Circuit diagram of the ordinary jump spark system.

made up of lead plates held in a sulphuric acid electrolyte. At the start both plates are the same, but under the influence of the charging current, chemical action starts, forming lead oxide on the positive plate and spongy lead on the negative. During the discharge the lead oxide on the positive is reduced to sponge lead and on the negative plate the spongy lead is changed to lead oxide. When fully charged, the positive plate is chocolate color and the negative a light gray.

The uses of storage cells need no comment, but the great disadvantage is the tendency to sulphate. In the hands of the inexperienced, the plates will tend to buckle as the result of faulty charging or discharging. These are a few of the many ills the battery may have, but when properly handled there is no piece of electrical apparatus more efficient, all things considered.

However, Mr. Edison has put his famous storage cell on the market and it is as near fool-proof as possible, with the added advantage of being able to stand long intervals of time without charging or discharging. A little higher in first cost than the lead plate, but the up-keep is very low.

CONDUCTORS.

In order that we may make the "juice" do useful work, it must be confined within a definite circuit; that is, the course must be complete from current source to the place of work and back again. Since we must provide an uninterrupted path of least resistance the next logical step would appear to be conductors.

Right here is where a whole lot outside the "not a few" fall down hard. Cheap wire always means plenty of trouble from short circuits, once in a while an open, very often grounds; in addition current is wasted. It's just like stopping the spigot and leaving open the bung.

To manufacture a good wire costs money and the return must be in proportion. Some makers put good insulating material over the copper and fall down on the protecting braid, etc.; others use old rubber compound and rely on a good braid to do the trick.

LOW-TENSION CABLE.

The best low-tension or primary cable is stranded, and therefore flexible; is made up of about forty strands of 30 B & S soft-drawn copper wire, generally tinned, and then twisted slightly. Over the bunch of wire as a core, is placed an insulation, generally 30 per cent. rubber compound and then covered with two layers of weather and waterproof braid. The whole is then treated with an enamel compound that makes the braid oil-proof in order to protect the rubber and yet not interfere with the flexibility of the cable.

HIGH-TENSION CABLE.

High-tension or secondary cable has the same class of core, insulated with the 30 per cent. compound, then in addition a layer of pure para rubber, another layer of the 30 per cent. compound and finally the braids followed by the enamel. When we consider the fact

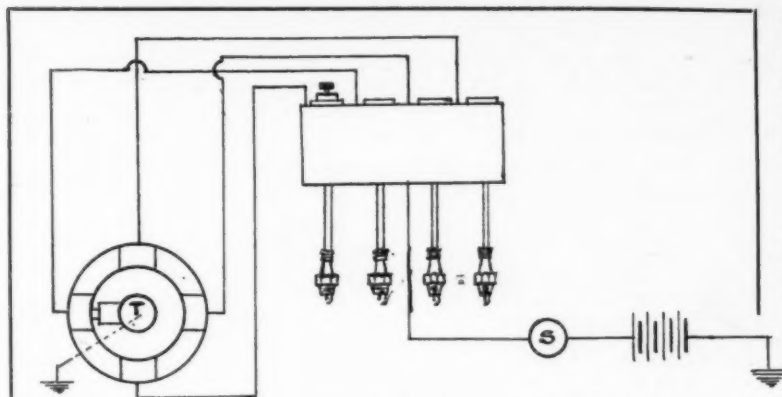


Fig. 5.—Circuit diagram of 4-cylinder system with individual coils for the various cylinders.

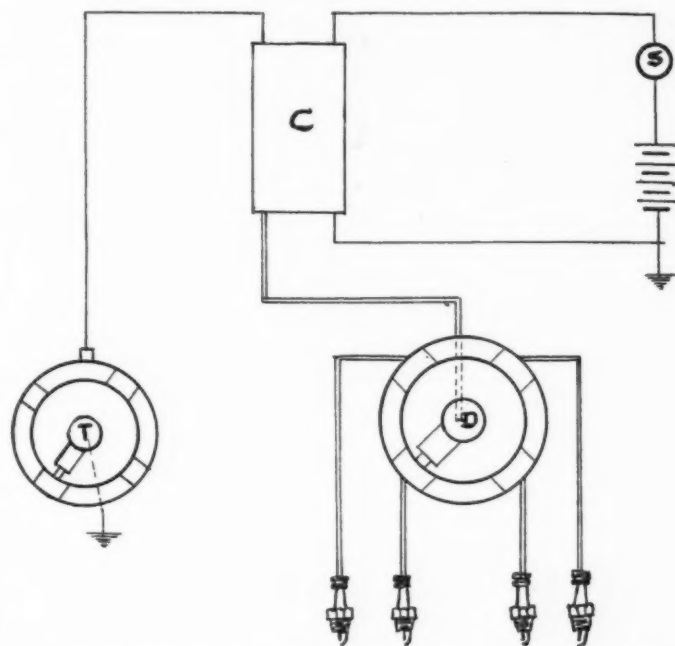


Fig. 6.—System using the master coil (C). The timer (T) and distributor (D) are shown separately for simplicity, but in the actual apparatus they are combined.

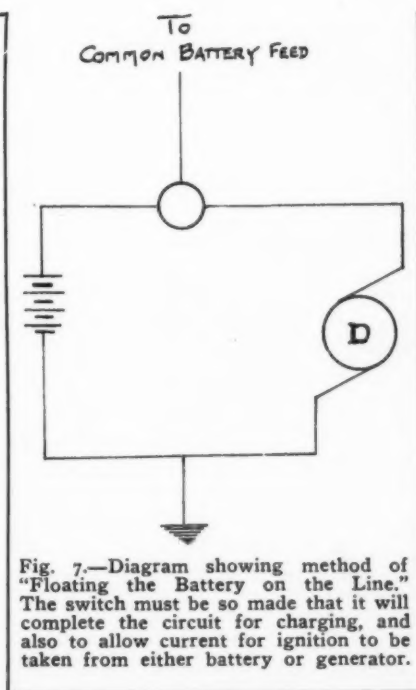


Fig. 7.—Diagram showing method of "Floating the Battery on the Line." The switch must be so made that it will complete the circuit for charging, and also to allow current for ignition to be taken from either battery or generator.

that the E.M.F. pushing through the cable will run between the approximate limits of 10,000 to 50,000 volts, is it any wonder cheap wire won't stand up any length of time?

SPARK COILS AND THEIR ACTION.

Before taking up the question of spark coils let us read the law: "The size and strength of the spark that any coil can deliver depends upon the number of turns of wire in the coil, the arrangement of the wire, the amount of iron in the coil, its quality and arrangement."

The low-tension spark coil consists of a bundle of soft iron wires, over which is wound heavy copper wire coated with enamel insulation, the ends of this wire terminating on binding posts.

When a current is passed through the coil it meets with two kinds of resistance, one called ohmic resistance, which all objects offer to the passage of electrical current, the energy to overcome which is lost in heat. The other resistance is that due to the building up of the magnetic field of the coil and is called the counter electromotive force of self-induction. This field supplies the energy for the spark when the circuit is broken within the cylinder of the motor. In order that this counter E.M.F. may be built up quickly without battery waste, it is very essential that heavy wire be used in the make-up of the coil.

Jump-spark coils, in addition to the primary or low-tension heavy wire winding, have a separate circuit made up of sectors of fine enamel insulated wire, impregnated with a dielectric under pressure and heat. This secondary circuit depends for its current on the fact that

if two coils of wire be placed in close proximity and a current be passed through one coil another current will be induced to flow in the second circuit, the intensity of which is greatest when the current in the first coil is quickly broken. If the first coil is converted into an electro magnet the effect is still further intensified.

Prof. Ames, of John Hopkins University, in his Theory of Physics, says of a spark coil: "The soft iron core of the two coaxial coils extends a short distance beyond the coils, and quite close to its end is placed a piece of soft iron which is fastened to the end of a stiff spring. When this spring is in its natural position it completes the circuit from the battery through one of the coils of wire; but, when the soft iron coil is magnetized by the current it attracts the soft iron on the end of the spring, and so breaks the circuit. When the circuit is broken the iron core ceases to be a magnet, the spring flies back to its previous position, contact is made and the current flows again, and the process is repeated indefinitely. As the field of force through the coil is increased and then decreased in succession it might be expected that the induced current in the other coil would be first in one direction and then in another. This, in fact, is observed, unless special precautions are taken.

A condenser is commonly inserted in the

battery circuit; this so weakens the E.M.F. on making contact that the tendency to reversal produces comparatively little effect.

DYNAMOS AND MAGNETOS.

The two machines for the mechanical generation of current differ, generally, very little; the dynamo is fitted with electro magnets, the magneto, with permanent magnets; one has brushes to keep the current direct, the other a collector ring, one ring only since the armature shaft forms the other side of the circuit. Both have armatures made up of coils of wire revolved in the fields of the magnets. The dynamo may be run with any convenient method—belt, friction drive, or gear wheel. The magneto, from the fact that there is a point where no current is generated, must have a fixed relationship to the crank shaft of the motor, in order that the spark be generated at the proper moment—at the beginning of the power stroke.

The two types of magneto, Low Tension and High Tension, operate on the same principle, the only difference being that the low tension current induced in the armature, by reason of its rotation in the magnetic field, is passed through a separate coil, or has an extra winding within the armature to convert it to high tension, in which case the armature acts exactly the same as the spark coil, and instead of magnetically breaking the circuit as is the case with the spark coil, the low tension circuit is broken mechanically.

There are a great many advantages to the high tension system, but there is no doubt that the spark produced by the low tension is hotter. It is obvious that if we take two shuttle armatures the same size, that it is possible to wind one with more heavy wire, and in so doing produce a greater quantity of current, than it would to put only a few turns of heavy wire and many turns of fine wire necessary for the high tension on the other.

The great disadvantage of the low tension ignition system appears in the mechanical making and breaking of the circuit within the cylinder. It is almost impossible to keep an absolutely tight joint where the moving electrode pierces the cylinder wall.

But we may get all the advantages of the low tension system and not have any of the waste power on account of leaks by using the magnetic make and break plug.

This device is a combination of magnet and spring, the magnet being used to draw the two contact points within the cylinder walls together when the circuit is completed through the timer. The spring causes the points to jump apart when the circuit is broken.

In addition to the great advantage of insulation the magnetic plug does away with all need of camshaft and the attendant gear.

The one great trouble with magnetos of

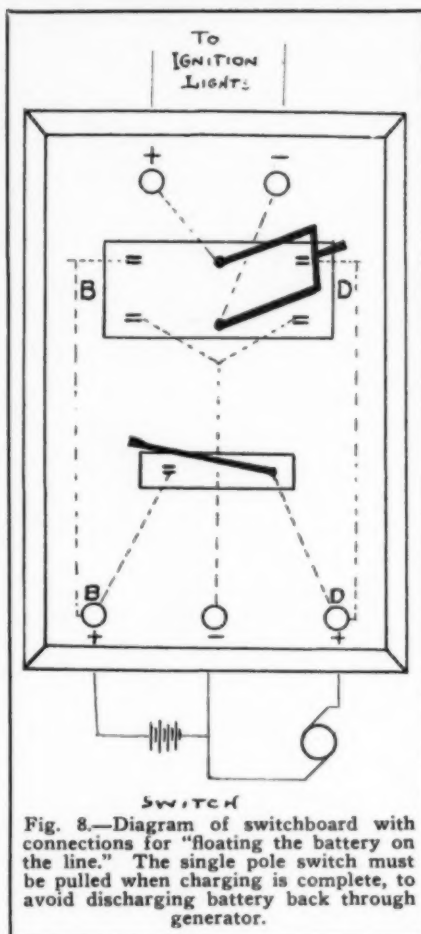


Fig. 8.—Diagram of switchboard with connections for "floating the battery on the line." The single pole switch must be pulled when charging is complete, to avoid discharging battery back through generator.

either type is their liability to lose the magnetism in the magnets. This may be readily restored, however.

THE MAKE-AND-BREAK SYSTEM.

Getting down to business, the simplest form of ignition, both in apparatus and wiring, is the low-tension make and break. The circuit may be readily traced in Fig. 3. From battery through switch and coil to the plug pin where the circuit is made and broken by the hammer *H*, operated either by a cam or gears; crank-shaft speed in two-cycle; one-half crank-shaft speed in four-cycle; thence through ground wire to battery. Of course, either the plug pin or the arm to the hammer within the cylinder must be insulated electrically from the motor. The mechanical generation of current is also provided for in the circuit diagram in the figure referred to.

THE JUMP-SPARK SYSTEM.

The circuit for jump spark seems to bother a great many; yet, if one were to study the diagram it would be readily seen that the two circuits stand out boldly. The primary circuit, starting at the battery and following the heavy line through coil to the armature through platinum points to segment in timer, through rolling contact, to the ground and thence to battery.

The secondary circuit: starting at the plug, follow light line, thence through common wire through switch, etc., to ground, to spark point where the jump takes place as the circuit is broken in the primary coil.

The function of the condenser was explained above, in the quotation from Prof. Ames' Theory of Physics.

These circuits form the basis of our present ignition systems and have been drawn for single cylinder for the sake of simplicity. Circuits for multi-cylinder mean, in the case of make and break, one set of electrodes only for each cylinder; for jump spark additional coil, plug and timing sector, except where a master coil is used, in which case only the plug and timing sector is needed.

ELECTRIC LIGHTING.

In either of the systems, where a direct current generator is used as the source of current, the excess current is generally run into a storage battery for light when the motor is shut down, also for starting the motor. The method of connecting a battery under such conditions is shown in Fig. 7 and is called floating the battery on the line.

Light on the boat is a serious question, especially where one has to often hunt trouble in the presence of an explosive mixture. No satisfactory argument may be advanced against the superiority of electricity as an illuminant; such being the case it only remains to select the outfit and the matter of installation.

For the average cruising boat where six volts is used for ignition the system should be six volts. The advent of the Tungsten lamp no longer calls for 12 volts for illumination with its attendant unbalancing of the battery. The dynamo should be of the 10-ampere variety.

THE SWITCHBOARD.

If it is possible be sure to get the standard switchboard, do so by all means. These boards are self-contained; everything needed is permanently fixed. They are really miniature copies of the large panels used in our power houses.

Cartridge fuses are used to protect the battery against accidental short circuits, wire resistance for introduction into the lighting circuit, to be used only when the lights are used at the same time the battery is on charge, materially prolonging the life of the lamps.

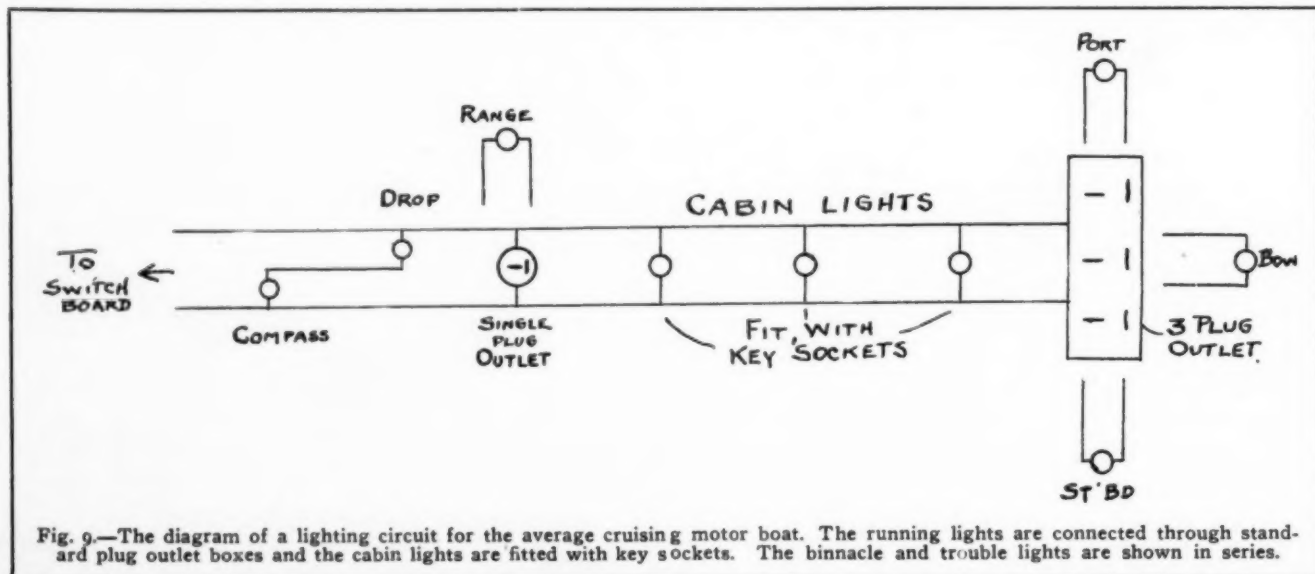


Fig. 9.—The diagram of a lighting circuit for the average cruising motor boat. The running lights are connected through standard plug outlet boxes and the cabin lights are fitted with key sockets. The binnacle and trouble lights are shown in series.

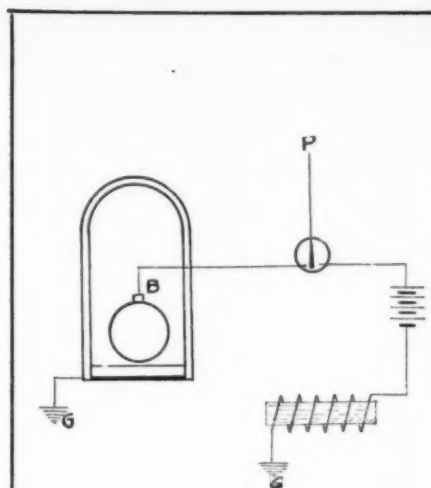


Fig. 10.—Circuit diagram of the low tension magneto.

B. Collector brush terminal.
G. Ground.
P. Cable to busbar connecting stationary electrodes.

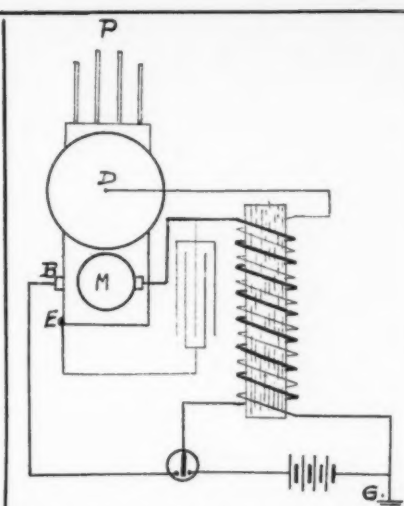


Fig. 11.—Circuit diagram of high tension magneto with outside coil.

B. Collector brush terminal.
D. High tension distributor.
M. Mechanical circuit breaker.
P. Cables to spark plugs.
E. Condenser ground on frame.
G. Battery ground.

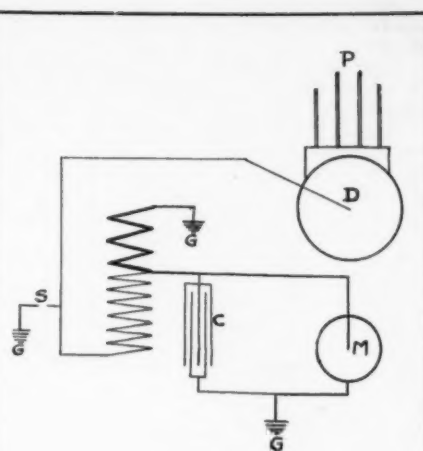


Fig. 12.—Circuit diagram of Hye Tension Magneto with both coils on the armature.

C. Condenser.
D. Hye tension distributor.
G. Grounds on frame.
M. Mechanical circuit breaker.
P. Cables to spark plugs.
S. Safety spark gap.

AUTOMATIC CUT-OUTS.

Automatic cut-outs adopt a principle used in motor starting boxes—when current is flowing from the generator part is shunted through a few turns of heavy wire which magnetizes an iron coil. This magnet holds down a spring blade closing the circuit. When the current stops or becomes lower than the charging rate, the weakened condition of the magnet cannot overcome the tension of the spring blade switch and it flies out, opening the circuit and preventing the battery from discharging through the generator.

WIRING.

For wiring use nothing smaller than No. 14

B & T weatherproof copper wire. Large conductors are necessary in order to cut down resistance, the selection of angle curved or dome fixture, hanging from cords or just plain lamp sockets, is personal. Running the line open or in moulding is also personal; the latter is the neater method.

Outlets to the running lights must be waterproof both from an electrical and comfort viewpoint, the latter on account of leaks into the cabin.

If you get a board with two pilot lights on it connect the running lights with these in series. It forms a tell-tale; if the pilot lights are burning the running lights are in a

like condition. If both are out, all are out.

Solder all splices; don't use acid as a soldering flux; it will cause the wires to corrode at the splices and later you will wonder where there is an open in the light circuit.

For the battery keep a bottle of distilled water in a locker, buy your acid in original packages; its pure. Half-pound bottles last a long time.

Don't try short cuts when charging. Do just as the maker states. Charging rates are generally stamped somewhere on the battery case; look on the name plate. Know your outfit; give it an ounce of attention and you will get the pound of service.

Propellers and Reverse Gears.

A Non-Technical Discussion of Propellers and Their Choice With Reference to Hull and Engine. Something About the Various Kinds of Reversing Devices.

By Henry H. W. Keith.

THE choice of a propeller for a motor boat, together with the selection of the reversing device, forms a problem which is solved only after considerable study. The designer or prospective owner must consider the efficiency of the complete installation rather than the efficiency of each part when considered by itself.

A propeller, engine, or reversing device may have a high efficiency when working under conditions suitable to itself, but when they are combined, a compromise is generally necessary to secure the best results. For example, the combination of a large propeller and a slow turning engine is best for a heavy cruising boat, although it may seem to many that the large propeller could be used with a light, quick-running engine and still do as well, together with saving considerable weight. The reason that it will not do as well lies in the fact that the pitch of the propeller will have to be reduced considerably in order to allow the engine to turn up fast enough. The pitch ratio, or ratio of pitch to diameter, will therefore be reduced, and this means that the propeller will not be so efficient.

Then, too, the engine might turn a fine pitch propeller so fast as to produce cavitation, meaning that the water would be unable to follow up the screw blades, and further loss of thrust and efficiency would ensue. The high speed engine naturally goes with the high speed boat, not only because it is lighter in weight, but because its large number of revolutions

will permit a small diameter, high pitch propeller to be used.

From the above it is seen that it will be necessary to consider carefully the relation of the revolutions of the engine to the speed of the boat, together with the power required to drive the boat at this speed, so as to get a good combination of engine and propeller. This can easily be done by means of the formula

$$r = \frac{R}{M^2} \times \sqrt{\frac{P}{M}}$$

where R = revolutions per minute

M = speed of boat in miles per hour

P = brake horsepower (on one shaft, if there is more than one engine)

r = a mathematical quantity which is constant for similar propellers working under corresponding conditions.

It has been found experimentally that when r has a value of about 3, or thereabouts, that the best results have been obtained from the propeller. This leads us to write the formula in the form

$$R = 3 \times \frac{M^2}{\sqrt{\frac{P}{M}}}$$

by means of which we can tell at the outset the revolutions best suited to the propeller, and at which the engine should develop its

full power. The best number of revolutions may be difficult to secure in many cases, but if the speed of the engine is somewhere near it, the selection of a suitable propeller may be determined.

Other important considerations affecting the choice of a propeller are the shape of the after body, the amount of deadwood, and the shape of the propeller struts. With boats having a full stern, the speed of the wake, or current of water following the boat, is a larger percentage of the boat's speed, than it is for boats of the runabout type, these having practically no wake. This means that for the full type boats we should take only a percentage of the boat's speed, say 90 per cent. when calculating the size of the propeller. This will result in an increased diameter and somewhat different pitch.

The flow of water to the propeller should be as unrestricted as possible. Behind a thick square deadwood or strut there is bound to be eddying, and the propeller will be working at a disadvantage. The remedy for this is to tip the blades back or place the propeller about one-third or one-half its diameter away from the deadwood, and also see that the latter is tapered, forming a fairwater to prevent eddying. Otherwise the propeller must be larger in order to get sufficient hold upon the water.

The propeller is also at a disadvantage when the angle of the shaft is considerable, say ten degrees or more. Not only is vibration likely to be present, but part of the thrust will be

exerted upward, instead of driving the boat ahead.

If the above considerations are adhered to, the selection of the diameter and pitch for an efficient propeller is a fairly simple matter. It may be stated that the blade area should increase with the displacement of various boats of the same length. As regards width of blades, no hard and fast rule can be given. Ordinarily, if the blade width is about a quarter or a third of the diameter, good results will be obtained, and contrary to the belief of many, the power absorbed by propellers of different widths working under similar conditions is about the same. Elliptical, or oval shape of blade is to be preferred, except perhaps for towing, when fan-shaped blades are often used. Three-bladed screws generally give the best all around results. Two blades are slightly more efficient in still water, but otherwise cause vibration. Four blades may be used in cases where the diameter has to be limited and the engine is slow turning.

The best wheels are of monel metal or manganese bronze. These are nearly as strong as steel and do not corrode. They also take a high finish and the edges can be kept sharp, both conditions being very essential to a good propeller.

REVERSING DEVICES.

REVERSING a motor boat is more a problem of selection than design. It is a very important consideration, however, as the safety of the boat and its passenger may at some time be dependent on the quickness and reliability of the reversing device. If a gasoline motor could be reversed like a steam engine, by simply shifting an eccentric, no trouble would occur, but unfortunately this is not the case.

A gasoline engine cannot be started by merely turning on the gasoline. It has to be started by some outside force in order to obtain any pressure in the cylinders. Reversing means stopping and starting in the opposite direction, so that it is evident that some external means must be applied when it is desired to reverse a gasoline engine.

In large 4-cycle installations, compressed air furnishes this means. The engine is slowed to a stop, another set of cams is shifted into position, and compressed air is admitted to the cylinders, thus causing the engine to reverse. The equipment necessary is expensive, even though it is not essential to furnish all the cylinders with air. Consequently its use is limited to only the largest motors.

Two-cycle motors can be run in either direction, and can be reversed by shifting the spark at the proper instant. The engine is brought to a slow stop, and just before the piston reaches the top of its last stroke, it is given the spark. The pressure developed will force the piston down again and the engine will run in the opposite direction. This method requires considerable skill, is hard on the motor, and there is nothing positive about it.

Even though an engine can be reversed by the above method, a clutch or reversing device of some kind is always to be desired. A one-way clutch is indispensable if a reverse gear or reversible propeller is not fitted, as by its means, the engine can be started without starting the boat, short stops can be made without stopping the motor, or the speed of the boat can be controlled by slipping the clutch. Again if the engine is reversed the same holds true.

Clutches are of three principal types, cone, plate, and internal-expanding. In the best clutches the pins and links are of hardened steel, and the engaging surfaces are accurately centered and of close grained metal. The clutch should run in oil, and be accessible for cleaning.

When a clutch is combined with some mechanical device which can change the rotation of the propeller shaft without changing the rotation of the engine shaft, we have the reverse gear. The mechanism is entirely inside the boat where it can receive proper attention. A solid propeller can also be used, the latter being desirable for strength and efficiency.

Speaking generally, there are but two kinds of reverse gears, the type in which the gears slide into mesh, and the type in which the gears are always in mesh. The former requires a separate clutch, but the latter can be combined with the clutch and operated by one lever. A desirable form of this second type consists of three principle parts: an oil-tight cylindrical casing free to revolve, and holding the gears always in mesh, a brake band on the outside of this casing to hold it stationary, and third, a clutch keyed to the propeller shaft so as to lock the casing to the propeller shaft.

When going ahead the clutch is thrown in and the brake band is off. The casing then becomes rigidly connected to the gear on the engine shaft and consequently must revolve with it, thus transmitting the power direct to the propeller shaft.

When running astern, the brake is tightened and the clutch thrown out. The power is then transmitted by the train of gears, the change in direction of rotation being secured by "idler" gears in planetary arrangement or by sprockets and chain.

In the neutral position both clutch and brake are off, so that no power can be transmitted. When the lever is pushed forward the boat goes ahead, when pushed aft the boat goes astern, and when the lever is in the middle, the boat stops.

The above description, or some modification of it, may be taken as the standard requirements of a good reverse gear. The gears should be fairly large and accurately cut to secure quietness, and should have removable bushings, so that they can be renewed when worn. Some means should be provided for taking up the wear on the brake band and clutch. Many makers place the gear in an extension of the engine base to secure good alignment, which is desirable. On the whole a large gear is to be recommended if possible.

Reverse gears should be used in boats where it is not essential to economize weight and space; if, however, a reverse gear is not desirable a reversible propeller should be used.

THE REVERSIBLE PROPELLER.

IN this type of propeller the blades are fitted to the hub in such a way as to permit of their being twisted about the center line of each blade as an axis. This permits changing at will the wheel from right-handed to left-handed by reversing with a lever in the boat, but as the propeller shaft always rotates in the same direction, the left-handed propeller becomes a backing propeller.

The reversible propeller is a compromise. The blades must be strongly attached to the hub, and the backlash must be reduced to a minimum (and it is an advantage to be able to

remove one blade without disturbing the others). Stops should be provided for the full ahead and astern positions, so that the thrust does not all come on the sleeve. All this means a large hub, which is not desirable in a good propeller.

To offset these disadvantages, a reversible propeller affords almost absolute control of the boat, and the operator can secure the pitch which is most suitable to his engine power and speed. It is also less expensive to replace a single blade, in case of damage, than a whole wheel.

The use of the reversible propeller is preferred by many instead of a clutch on account of its light weight and the fact that it ordinarily occupies less space. Considerably more practice is required, however, in making landings with the use of this device as the revolving propeller has a tendency not only to retard the motion of the boat more than would be expected, but it also serves to swing the stern around in the direction in which the propeller is revolving.

Of course, the advantage of being able to replace a single blade if one is broken off is a valuable one, but even with this the blades must be made to balance or a knock will be noticed when the shaft revolves. Then, too, it is somewhat difficult to set the blades upon exact "center" as there is usually too much back lash to cause the exact idle point to be accurately determined.

The full-ahead pitch for the wheel should be calculated in the same way as for a solid wheel, as it is a fact that although the blades can be twisted, the resulting pitch for the new position will vary quite a little from root to tip, instead of being constant as it is for a true screw.

For a 16 x 16 inch wheel twisted 10 degrees, the pitch at the tips will be about 20 per cent. greater than it is in the middle of the blade. This means that if the propeller blades have to be twisted very much from their designed position in order to allow the engine to do its best, it will be better to use true screw blades of a different pitch rather than twist the blades through so much of an angle. An important requirement of a reversible propeller is that in every position of the blades the pitch for all should be the same.

MEASURING PITCH.

IT is a comparatively simple matter to measure the pitch of a screw propeller. Draw a circle of about half the diameter of the wheel upon some flat surface and place the wheel at the center of it, making sure that the axis of the hub is perpendicular to the surface. Measure the normal distance from the circumference of the circle to a point on the blade edge directly over it, marking on the circle the point from which the measurement is taken.

Repeat this for the other edge of the blade, and draw the two lines from the points on the circle to its center, thus forming an angle. The pitch in inches of the blade at this distance out from the center will then be the difference in the perpendicular measurements in inches multiplied by the ratio of 360 degrees to the angle above mentioned. This may be repeated with circles of other diameters and the pitch found for each. Obviously, for a true screw it should be the same throughout the entire length of the blades from the hub to the tip.

HOW TO BUILD A HYDROPLANE

One of the interesting features of the January issue will be an article by Henry Douglas Bacon on how to build a hydroplane of the stepless type—a fast little craft with a concave after bottom like that of Sand Burr. There will be complete drawings to guide the amateur builder and photographs of the finished boat. And, by the way, watch for the cover of the January issue—it will get you.

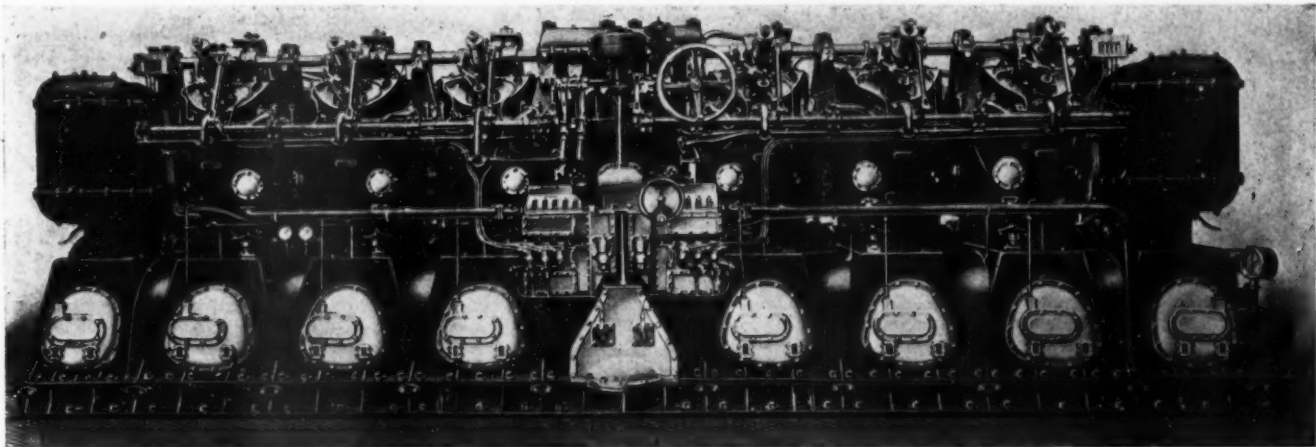
Diesels for the German Navy.

The Famous German Ordnance Builders Constructing Several Large Units of the Trunk-Piston Type for Vessels of the Kaiser's Fleet.

THE accompanying illustration is of a 1,000 h.p. six-cylinder Diesel engine, one of several built by the famous German firm, Fried. Krupp, of Kiel, for the German navy. It is of the trunk piston class, as, with a view to keeping the weight low and to give the maximum protection from gunfire, it was desired to avoid the extra height involved by the adoption of crossheads. The engine runs on the two-stroke cycle, ports being uncovered by the piston toward the end of the stroke, the exhaust on one side and the air inlet or scav-

enging port on the other, the latter being supplied with air at about 3 lbs. per sq. in. The construction is very simple, there being only two valves per cylinder, and these are set in an inclined position in the cylinder heads; one is, of course, the fuel injection valve, the other being for the admission of compressed air at starting and for reversing. The engine has two low-pressure compressors, for supplying the scavenging air, one being situated at each end of the engine, and supplying the three cylinders adjacent to it. The high-pressure

compressors, situated between the two groups of three cylinders, are also duplicated, each supplying three cylinders. This separation of the engine into two sections is to be commended, as it insures to a great extent immunity from breakdown; a fault in one part of the engine not necessarily affecting the other part. The camshaft, running above the cylinders, is driven, it will be noted, by gearing in the middle of the engine, in which position all controls are situated, which is clearly shown in the illustration below.



One of the 1,000-horsepower Diesel marine engines built by Fried. Krupp, of Kiel, for the German navy.

A New Series of Articles.

Captain Howard Patterson, President of the New York Nautical College, to Write for MoToR BoatinG, Taking Up the Subject of Navigation from a New Standpoint.

MUCH has been written from time to time on the subject of navigation in its various phases, but so far as our experience goes, at least, little of it has been able to stand on its own legs as interesting reading. It seemed to us, therefore, that there was surely some way of approaching this subject so important to all who cruise or race in open water, in an interesting way—and so we talked the matter over with Capt. Patterson.

The forthcoming articles will deal with the various devices used in navigation, their discovery and evolution, with the best way of obtaining satisfactory results from their use, whether for domestic or deep sea cruising—within sight of land—or when only the bare horizon line presents itself.

Most of us have envied the absolute independence of the expert navigator, and these articles will offer an opportunity of acquiring this independence. They will be as valuable to the man who runs the small boat as to those who "go down to the sea in ships."

To the Eastern yachtsman Capt. Patterson needs no introduction. Under his instruction have graduated such representative American yachtsmen as the Belmonts, Elys, Enos, Gerrys, Gallatins, Goulds, Goelets, Iselins, Halls, Hamiltons, Harpers, Hills, Hoyts, Kaness, Monks, Morgans, Osbornes, Posts, Stewarts, Thompsons, and a host of others. In fact, the list of names of those who have taken instructions under him in navigation and seamanship during the thirty years that he has been teaching, reads like a directory of "Who's who in Yachting."

In writing these articles Capt. Patterson will draw on a thorough knowledge, practical and

theoretical, of the sea and the navigator's art, for his experience has not been limited to teaching. At one time a captain in the U. S. navy, a flag officer in a foreign naval service, captain of sail and steam vessels, com-



Captain Howard Patterson, who will write a series of articles for MoToR BoatinG.

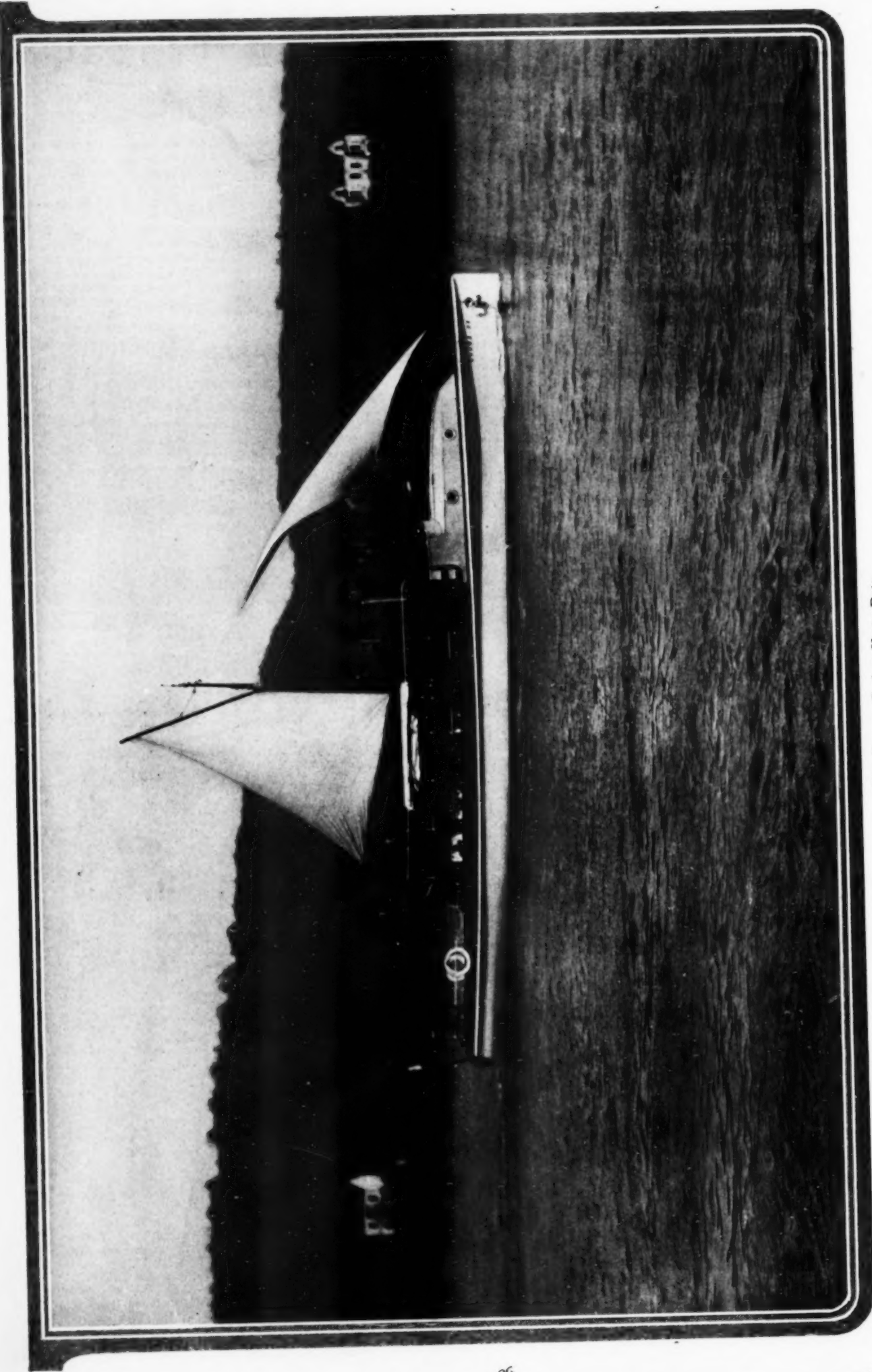
mander of the New York schoolship, St. Marys, he has a limitless field of practical experience from which to enliven his writings until they lose all semblance of the usual textbook style. In fact, Capt. Patterson's name stands out pre-eminently at the head of those most capable of presenting such a subject, and he is a welcome addition to the contributors to MoToR BoatinG.

There will be a number of other interesting features in the January issue, among them an article on "How to Build a Monoplane," by Henry Douglas Bacon, with complete drawings for the amateur builder and photographs of the completed boat.

The monoplane, for small sizes—say, in the 20-foot class—is possibly the most efficient type of hydroplane. In so small a craft there is little use of subdividing the bottom for stability, and there are advantages, such as simplicity of construction, that more than swing the decision in favor of the monoplane for the man who builds his own boat. The construction is along the same lines as described by Mr. Bacon in his article on the V-bottom runabout and which was found to be thoroughly practical by a number of amateur builders.

Mr. Fauber, the pioneer of successful hydroplane designers, will write in justification of the multiplane type of hydroplane which has been criticised by several writers recently. His article will bring out several new phases of the discussion.

We'd like also to call your attention to the January cover—a painting by Mr. Stoddard. Look for it and if you like it write and tell us so. If you don't, tell us what you'd like better.



The German Cruiser Up-to-Date.
The Lürssen-built 62-footer, *Albatros*, is representative of the highest development in the cruising type of motor boat in Germany. Consistent with the usual German practice, the two 45-H.P. Daimler motors are installed forward in the forecabin and controlled from the protected forward cockpit, while the living quarters are aft.

Developing the Foreign Fields.

Suggestions for the American Motor and Accessory Manufacturer Who Would Develop an Export Trade—and the Wonderful Field Awaiting the American Product.

By B. Olney Hough,

Editor American Exporter.

LUCKIEST among American manufacturers are our makers of marine motors, at least so far as the export trade is concerned. To few others have orders come so easily, so freely and so profitably. Probably nine-tenths of the American marine motors that have been shipped to foreign lands have at first been bought "sight unseen," and there have been many thousands of them. This does not mean that some of our manufacturers have not made real efforts to obtain foreign orders, yet it must be confessed that the bulk of this trade has come to us and that few of us have gone after it.

It takes some courage, it will be confessed, for a buyer 3,000 or 10,000 miles away to send a banker's draft for a goodly sum of money to the United States before he is granted the privilege of so much as inspecting the American motors that he has heard about, or that look good to him on paper. The fact that foreign shipments of our motors have grown so fast in number and in volume is a deserved tribute to their intrinsic excellence and to the high character of our manufacturers in this line.

France may, perhaps, be called the home of the motor for car or for boat, yet only a few weeks ago two letters from different cities in France arrived in New York by one mail, expressing satisfaction with certain American marine motors that had been tried and found very much more satisfactory, for their cost, than the native and more expensive French machines. American motors are proving the salvation of some of the planters of Central America, enabling them to traverse economically the only highways leading to the commercial centers of their several countries, the lakes and rivers. Our motor boats transport bananas in Nicaragua, coffee in Costa Rica, and contribute to establish more firmly our national vice of chewing gum through the assistance they lend in the collection of chicle in the state of Tabasco, Mexico. American motor boats take part in and win races in the Baltic and the Bosphorus, and all of this trade has thus far come to us almost unsolicited, if not literally, at least in comparison with the strenuous efforts which manufacturers in other lines have had to put forth in order to win even a fraction of the volume of foreign business which marine motor and motor boat builders are now enjoying.

It is true, as already suggested, that some of our manufacturers have made really serious efforts to extend their foreign trade, but it is also true that a great many more manufacturers have done little more than pay for advertisements and write circular letters. It is probable that for some time longer similar tactics, unassisted, may prove successful, but the time cannot be very far distant when, in addition, a more earnest, and one may call it, a more scientific effort will have to be made to get foreign business and to increase foreign trade already established. The selling of a single marine motor in Norway, or a succession of ten or twelve sales is undoubtedly very agreeable to the lucky manufacturer and even very flattering to his pride, but unless he follows up the sure clue they afford to unlimited possibilities throughout the world such sales are comparatively of little real importance. Every maker of marine motors ought to understand that if he can do a little business in one market with comparatively little or with no real personal exertion on his part, there are scores of other markets where possibly even greater success may be found.

Probably no one in this country is more capable of discussing the subject of Exporting in all its phases than is Mr. Hough. His article in the last year's Export Number of *MoToR BoatinG* has offered many suggestions to those manufacturers who are new in the export business, and this year's article is even better.—Editor.

NOWADAYS the perennial cry of the United States consul, no matter where he is located, is that American manufacturers in all lines are making the most serious mistake in attempting to do business on catalogues, and the consul in the most unimportant market in the world is just as certain as consuls in the great commercial capitals, to advise manufacturers that catalogues are invariably dumped into the waste paper basket and that the only way to get trade is by sending out duly qualified American salesmen from the United States.

The experience hitherto of motor boat builders and marine engine makers is the strongest sort of contradiction to the usual official dictum. Thousands upon thousands of our motors have been sold through correspondence alone to customers who have never set foot in the United States, who cannot read a word of the English language, and have no other acquaintance with our manufacturers than that obtained from a series of letters. None the less it is high time that manufacturers reverse their practice and take measures for a more adequate development of the opportunities that certainly await them.

The selling of a motor is really an easy thing in spite of the difficulties that sometimes seem to surround it. The thorough development of trade in the district to which that motor goes is another question. It may be true that it is the first step that counts, but it is even more emphatically true that there are few goods that sell themselves, and that motor boats and marine motors are not numbered among those few. True, the possessor of a Brown & Green Company's engine may be well pleased with his acquisition and recommend it to his friends. A few additional orders may result. The merchant who handles Brown & Green Company's motors may find it possible to secure a few orders, but in either case there are competing manufacturers looking after trade in this same territory, and a representative of Black, White & Co. is likely to come along some fine day and by dint of suave argument and one or more good dinners displace the Brown & Green Company's line. If export trade in motors or in anything else is worth anything at all it is worth a far more serious effort than most manufacturers have yet made. That effort should include not only a more thorough and more systematic drumming of foreign markets but the supply of expert mechanics as instructors, and the establishment of adequate depots of repair parts in suitable central locations abroad. This is what American manufacturers must look forward to in the near future if they are to increase their trade in ratio commensurate with possibilities now in sight.

* * *

NO manufacturer can, of course, take the thorough measures for the development of a market that have just been hinted at in every promising foreign field at one and the same time, or even in the course of a single year. The point is that a broad, firm and solid foundation ought to be laid for the future, that work on that foundation should begin to-

day and should be continued as fast and as thoroughly as the conservative and profitable conduct of business may warrant. Export trade, either in motors or anything else, is worth nothing at all unless it is profitable.

The manufacturer, however, who attempts to pocket all of the profits that come to him, often in a haphazard way, makes a serious mistake. A part of those profits ought to go back into the effort to extend his foreign business, to develop it more thoroughly in markets where a start has already been made and to make a similar start in other and unknown markets. This is one feature of business which is receiving too little attention from our manufacturers at present. Few of them seem to be planning adequately for the future.

The rejoinder that is certain to be made is the very old claim of plenty of domestic business to keep factories going. Motor boat and engine people, like other manufacturers, seem to be pleased to obtain an occasional foreign order, which in the aggregate may indeed amount to a very large sum of money, but when urged to take up the export business in earnest, to go about it in a thorough, systematic and scientific fashion, are sure to fall back on the big volume of domestic orders in hand that is keeping the works going eighteen or twenty hours a day; but no export business that is worth the while is the development of a day's or a year's work. Plans must be made, preparations begun, some time before actual results can reasonably be expected.

Not many years ago a prominent American manufacturer of automobiles began his preparations for an invasion of foreign markets. This automobile man's home trade also was all that he could handle. When he began to look into foreign business he had not one single car that he could offer, and his engagements were such that for months to come he would have no cars to spare for buyers in other lands. None the less he began advertising in an unusually liberal manner. He ran full-page and double-page announcements in leading media for the sole purpose of getting in touch with interested concerns in the principal markets of the world. He took other means also of making his goods known to the prominent people in his line the world over. In his announcements he frankly stated that he had no cars to sell, but drew attention to the fact that his plans included plenty of cars for export in the near future and that he was in position to negotiate for suitable agencies everywhere. A mass of correspondence resulted which it naturally took months to sift. In the course of those months, however, the sheep were separated from the goats, and when another season arrived contracts were made for agencies in a number of the world's principal markets, calling for deliveries of from ten to five hundred cars for the first season for each market.

This may be called far-sighted business and should serve as an example to the ambitious manufacturer of marine motors or motor boats who is not satisfied to stand still and who wants all the business that he can get, abroad as well as at home, and is quite ready to provide facilities for meeting the increase in business when it comes.

* * *

A GOOD many manufacturers look on the export trade from a radically mistaken viewpoint. The dilatoriness of some of our manufacturers in filling orders has been frequently dinned into their ears and into the ears of the whole country with the conse-

quence that other manufacturers go to the other extreme and fill orders too hastily. The expression is not unique that in such cases the manufacturer is hypnotized by the receipt of an order bearing a foreign postage stamp. The consequences sometimes are that chances are taken with orders that are not clear and explicit, and other chances of a financial nature with unknown correspondents, because the manufacturer is afraid to wait the requisite length of time to obtain an explanation of details that are not clear, or to secure references about the proposed customer. No such haste is called for in export trade.

The man who writes to a manufacturer from Buenos Aires and gives local banks as references expects that those references will be rigorously investigated, and fully realizes that such an investigation will occupy from three to four months' time. He has no expectation whatever that manufacturers will enter into business relations with him until they know all about him. Similarly, the man whose order is not clear in the first instance would a hundred times rather wait two or three months to have the misunderstandings cleared up than have something shipped to him that he does not want and did not order.

So it is with the further development of export business. It usually is and it ought always to be, slow. No matter, then, what a manufacturer's domestic trade may be to-day he need not fear being swamped with export orders in the course of a month or two after he begins a campaign to get them. Our manufacturers have made a magnificent start in export fields. While no figures are available yet few will dispute an estimate of several million dollars a year as the present volume of our shipments of marine motors, while 663 motor boats, according to the Washington authorities, were shipped from the United States to foreign countries during the year ending June 30, 1911, having a total value of approximately \$382,000. All this, however, is no more than a gentle hint of what can be accomplished, and now—to-day—is the very time when a more serious and more energetic campaign ought to be undertaken by our manufacturers on the basis of their present accomplishments.

REFERENCE has been made above to the fact that our marine engines are being welcomed in France. In a certain way marine engines and boots and shoes are brothers in this trade. It is not very many years ago that French shoes were regarded in the United States as the *ne plus ultra* of ladies' footwear. To-day American shoes are welcomed in Paris and are sold by thousands of pairs. The fact that there existed an important shoe manufacturing industry in France, as in England and in Germany, did not deter American shoe manufacturers from entering those markets. Similarly, American builders of marine motors have found it entirely feasible to introduce their products not only into France, England and Germany, but into Scandinavia where very excellent marine engines are also manufactured. If this is possible then, it becomes evident that the development of markets for our motors in other countries ought to be comparatively easy.

It is true that the motor boat, whether as a toy, a pleasure vehicle or a freight carrier, is as yet comparatively new and strange in many countries, but even in them the future is safe and is bound to be a large one. The fame of the American marine motor is already worldwide. Before the writer lies a letter from an engineer in a distant city of Russia inquiring as to the date of the next motor boat show in New York which this correspondent is anxious to attend.

The progress that some of our manufacturers have made in satisfactorily producing motors using kerosene for fuel, or adapting gasoline burning motors to kerosene in such a way that the most captious of foreign critics are satisfied, will undoubtedly contribute materially to the increase of our foreign trade, since in a few markets gasoline is still a luxury to be had only in principal cities and at

high prices as the automobilists' necessity. Somewhat broader markets are therefore open to the maker of a kerosene motor than to the gasoline motor manufacturer, but for both opportunities are ample and enticing.

AT this point it is perhaps proper to address some remarks to the foreign buyer of American motor boats and engines. It is clear enough that our products in these lines embody certain characteristics that make their consideration worth while. It would be impossible for our manufacturers to sell their goods in England, France, Germany and Scandinavia, for example, in competition with locally made goods, unless certain distinct and notable advantages were found. That they are thus being sold is a fact susceptible of proof in a dozen different ways by anybody who chooses to look for it. Yet, a word of warning to the foreign buyer who is not familiar with American motors is called for. Neither in the United States nor anywhere else can the buyer of a marine motor or of any other article obtain something for nothing.

A buyer cannot obtain the same motor for \$50 of one manufacturer that a second manufacturer appears to charge \$200 for. It may be that the \$50 motor will answer a buyer's every purpose. Certain it is that thousands of the cheapest grades of our motors are sold for export alongside of other thousands of high grade motors that are also sold to foreign countries. There is nevertheless a class of foreign buyers that seems to expect that one will get just exactly as elegant and refined a piece of apparatus from a manufacturer of the cheapest motors that he can hear of as from the maker of the highest priced motors.

For example, the writer has just had the privilege of reading a letter from which the following is an extract. It should be read with a certain indulgence for the writer's English in view of the difficulty most of us would have in writing as good a letter in a foreign language. "Cannot decide which one to take. Every manufacturer says his is best. Cannot make my pick out of them. American are not liked because the few here are very flimsy and not well made. To win the market here they must be well built, with all the latest improvements, very strong, without any noise, but not expensive." Now, here is a buyer who may be said to be looking for something for nothing. He wants all the latest improvements, a strong and well built motor yet "not expensive." He is typical of a whole class that seems to look upon the United States as a wonderland where most remarkable things are produced and sold for little or nothing.

This buyer may or may not have use for a motor that will justify him in purchasing some of our cheapest makes. On the other hand, some of our highest priced motors might not be too good for his use. He complains of American motors that have already been introduced as being "flimsy and not well made." While he does not describe these motors or in any way identify those that have been tried, it is a practical certainty that, following the bent of human nature the world over, the first trials of American motors have been made with those that cost the least money. The buyers, and this particular correspondent, seem never to have compared cost price with quality.

Judging from the experience of a good many years, the facts almost undoubtedly are that merchants or motor boat owners who have hitherto purchased very high priced European motors have expected that they will get from the United States motors at one-quarter the cost that would be in every respect comparable and even equal to the others. This cannot be done.

THE American motors that are being sold for export are well worth the price asked for them and something more. Many of our higher priced motors are the equal in every respect of high grade motors made anywhere. Our cheaper motors cannot be duplicated by motor manufacturers in other countries.

It must only be a question with the foreign buyer of motors whether the American type that he has made up his mind to buy is or is not worth the price asked for it. He cannot compare a \$50 American motor with a \$200 motor, whether made in the United States or in Europe. If he wants a \$50 motor he can buy it and he will get full value received. If he does not like the \$50 motor then he can spend more money with some other American manufacturer and still get a motor at a price that European manufacturers cannot duplicate. If he is intent on nothing but the best, with all sorts of accessories and improvements, he will have to pay for it no matter whether he buys it here or buys it in some other country. Let it not be forgotten, however, that American motors, all things considered, no matter what their price, offer a number of advantages over those made in other countries.

REVERTING now to the position of the manufacturer in the United States, the question of how to introduce a manufacturer's motors to foreign buyers is susceptible of being answered in several different ways. One may simply "go gunning" for buyers—any kind of buyers—and fill orders indiscriminately as they are received. One may fix his attention on certain large, prominent or peculiarly desirable connections in different markets and not rest contented until they are secured as agents. One may seek for the motor boat owner's orders, either because liberal prices are thus obtainable or for the sake of making the motors known in a market in this fashion with the ultimate intention of confining business to a merchant or a wholesale distributor.

But whatever is done, one thing ought never to be lost sight of and that is that quotations of prices ought to vary with the caliber and character of the customer. A manufacturer who quotes one price only, and that his rock-bottom, best price to all comers, is not only destroying his own chances of doing business with the biggest and best merchants, but he is seriously injuring his general trade, and the trade of other American manufacturers, in the markets to which he thus introduces himself. A marine motor is not a barrel of sugar and there is no such thing in the trade as a standard price. Of all considerations affecting possible sales of motors that of price is possibly the least important.

There exists absolutely no necessity for any manufacturer to cut prices for the export trade. On the other hand, liberal prices ought to be easily obtainable and are really required, because extra care and attention, both of which mean expense, are necessary in the proper development of any export trade. Liberal prices are especially necessary when a manufacturer contemplates a really serious and scientific effort to establish and build up a big foreign connection along lines that have already been indicated. It is a far more serious matter to make quotations too low than to make them too high. Every manufacturer ought to look beyond the end of his own nose and make plans for the future—plans that ultimately, if not in the beginning, will involve the expenditure of money, perhaps a good deal of money.

No maker of motor boats and no other manufacturer "splurges" at the outset of his export trade. He begins carefully and cautiously, spending a little money, watching the returns, putting a little more money with a part of the profits received, and gradually building up a trade with foreign customers that in the case of certain manufacturers of marine motors with whom the writer is acquainted, actually amounts to from 50 to 90 per cent. of their whole business. The great thing, the all important thing, is to study export possibilities and to make adequate plans for developing each and every market to its fullest extent.

IT is very much the fashion nowadays to criticise American manufacturers as to their export trade—the trade that a clever writer in one of the popular weeklies has recently characterized as "the trade we are scolded about." In no respect is there more

frequent criticism and more severe scolding than in regard to the packing of our goods. The truth of the matter is that on the whole our packing is equally as good as that of any other exporting nation. English, even German, practically all other manufacturers are similarly criticized now and then by their own nations; the greater row that is raised in this country in this respect seems to be due to an exaggerated ego and the all pervading ambition on the part of our critics to have everything American just exactly right. A few of our minor manufacturers, some of them just beginning to do a little foreign business, undoubtedly make mistakes in regard to packing, but the great bulk of our export shipments are adequately protected and offer no basis for fair criticism.

The only thing that is necessary on the part of any manufacturer is the exercise of a modicum of common sense and the possession of a general idea of how export goods are treated in shipment. Many people nowadays have crossed the Atlantic at least once and have had the opportunity of acquiring at least an elementary idea of how goods are loaded and unloaded. The application of such ideas is all that is required in order to ship goods so that they will arrive in satisfactory condition.

Of more importance is the question of the finish of our motors. More attention ought to be paid to this point by manufacturers, for customers almost anywhere else in the world are not pleased or satisfied with rough castings such as we sometimes find in our cheaper grades of motors. It would seem an easy thing to remedy this matter. A slight extra charge would certainly cover all of the "dope" necessary to put the cheapest motor in slightly appearance.

MOST of the preceding remarks apply to motors rather than to motor boats because in the latter there must always be a more restricted trade, owing partly to the difficulty of shipping boats to some markets and the obtaining of rates of freight that will enable them to compete with home-made prod-

ucts of foreign countries, and partly to the initial cost of our boats, due to high priced American labor.

A whole chapter, however, might be written on the actual and prospective sales for all sorts of adjuncts and supplies for the motor and the motor boat. For such lines there exists a very attractive market throughout the world and they perhaps require a little different handling than do complete motors. Thus the manufacturer of motors will, as a rule, probably find it most convenient and advantageous to place his local agencies in different markets in the hands of established merchants. The manufacturer of parts or supplies, however, will recognize certain advantages attaching to the native commission agent, that is, the man who does not buy for his own use but sells goods to established dealers, very much as the manufacturers' own drummers sell to the trade here at home.

While a motor agency should very likely be controlled by one merchant in a town or a district, and it is doubtful if any great advantage would accrue to the securing of orders from several competing merchants in the same town, yet as regards many accessories a different state of affairs prevails. There is no reason apparent why propellers of one and the same brand, for instance, should not be sold to each and every motor boat builder or dealer in a town, and this result can best be accomplished by the salesman who is acquainted with the different dealers and has character and influence enough to induce them to give him their orders. The American manufacturer, therefore, who corresponds only with one dealer with whom he has chanced to get into communication and restricts his trade in a whole district to that one merchant in such things as propellers, reversing gears, horns, lamps, whistles and what-not, will probably miss a good share of the total business that might be his were he to establish a local agent competent to sell not one but all of the dealers in his territory.

Since it is obviously impossible for a manufacturer to send out his own men from the

United States to every attractive foreign market, the natural solution of the question is the placing of the goods in the hands of local resident agents who, it may be remarked in passing, are very much more freely used by European manufacturers than by our own.

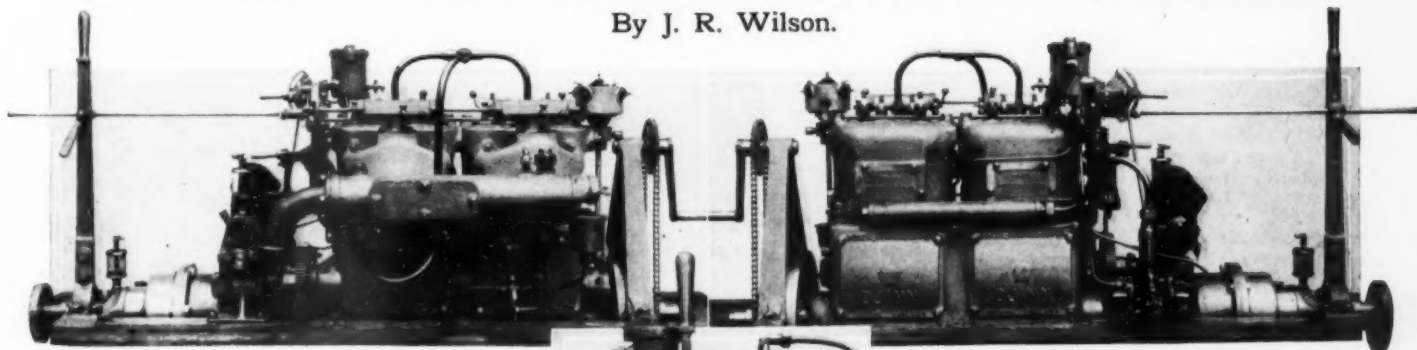
IN this country we seem to have a general prejudice against the foreign commission agent. It is true that the great majority of such agents are of very small caliber and not always desirable connections. On the other hand in every market there are reliable, intelligent, aggressive agents who represent some large foreign manufacturers and the writer is confident that if the right sort of an effort is made by a manufacturer his trade will be enormously increased by the selection of some of the high class agents of this description, after very careful investigation, of course, in those markets where there exist a great many possible customers.

Quite apart from the question of sales, there are many other advantages that attach to representation through such an agent. In any business, for example, there must always arise some complaints—sometimes justified and sometimes very much the contrary. It is the part of the local resident agent to adjust such complaints, to say to the customer who complains without reason, "These goods are all right; you have got to take them and pay for them;" to say to the customer whose complaint is a just one, "You are quite right, we are sorry that this happened. I will take these goods and dispose of them elsewhere and send you the right goods, or we will make you a suitable allowance."

A very large saving is bound to result from a fair and intelligent treatment of claims by a local agent in the case of any manufacturer who is doing a considerable business. There are a number of other considerations, too, that can hardly find place here, which argue strongly in favor of this sort of representation for a manufacturer whose goods can be handled by many competing firms in the same market.

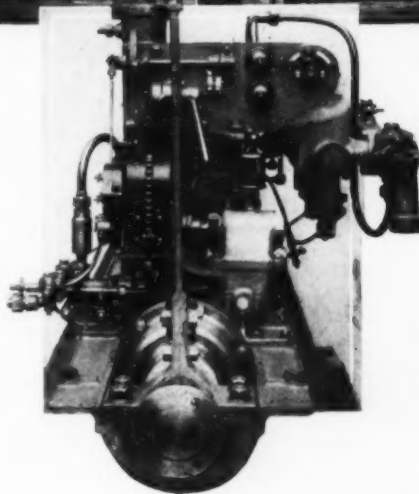
BRITISH GASOLINE-KEROSENE ENGINES.

By J. R. Wilson.



The Djinn.

IN Great Britain, as well as in the United States, there are both good and bad engines on the motor boating market, as some of us have discovered to our cost. There is a well-worn saying that "the best is cheapest," and this applies with force to a marine oil engine that has to plug away day in and day out for many a year. The cheap British engines, of which there are many, are of no particular interest to readers of *MoToR Boat-ing*. I hope to describe in a short series of articles some examples of engines that are really well-designed and built by marine engineers for work under maritime conditions. A study of these engines will give a good idea of the practice in vogue across the herring-pond, and many interesting pros and cons may be discovered. Owing to the cost of gasoline being as high as 25 cents per gallon, as against



kerosene at 8 cents per gallon, the majority of British engines are designed and constructed to run on both fuels.

The first engine I am dealing with is the Djinn, manufactured by Messrs. Brazil-Straker & Co., Ltd., Vulcan Iron Works, Bristol, England, of which there are many ranges, the largest at present being the four-cylinder 180 h.p., two of which are fitted in the 303-ton auxiliary schooner yacht *Fantome*.

The illustrations show a four-cylinder 20-22 h.p. set complete with reverse gear ready to drop into a boat. It is of the four-cycle type, with cylinders cast in pairs, having a bore and stroke of $3\frac{1}{4}$ -inch and 5-inch respectively, and the power is developed at 950 to 1,000 r.p.m., the compression being 63 pounds per square inch.

The bed-plate is extended, carrying the reverse-gear in a hollow trough aft, so that the equipment is self-contained. Although the

crankcase is enclosed, the cylinders are supported upon strong steel columns bolted right through the bottom half of the crankcase so that there are no stresses on the upper half. There are, of course, ample water-jacket spaces, and inspection doors both to the cylinders and crankcase. Both inlet and exhaust valves are arranged on the starboard side, the valve-pockets being equipped with removable caps.

Between the reverse-gear and the after cylinder, the high-tension magneto, water-cooling pump, fuel pump, lubricating oil pump, and control board have been placed; the magneto being driven by enclosed gearing, while the three pumps, all of the plunger type, are worked by a balanced eccentric off the after end of the crankshaft. Oil is delivered at a pressure of 20 pounds per square inch through sight-drip feeds to all working parts, an adjusting pressure valve being fitted to prevent excess of oil.

From a distributing reservoir the fuel pump delivers the fuel to the float chamber, excess fuel returning to the tank by an overflow pipe. At the forward end, near the chain-driven starting gear, is the high-tension ignition distributor, which is worked off the end of the camshaft, by enclosed gearing, and is mounted on a vertical spindle.

The exhaust pipe is entirely water-cooled and is of novel construction. It is of cast iron and is fitted with branches which couple direct on to the cylinders. Inside the cast-iron pipe is another pipe of the pattern used in supplying feed-water to steam boilers. It is perforated at intervals and into this pipe the cooling water is fed so that the sudden velocity, due to the delivery stroke of the plunger type of pump is prevented from causing unequal feeding. Thermometer tests with this arrangement have shown that the difference in the several cylinder-jacket water temperatures is negligible and much more uniform

working is therefore assured. The control board is of steel and carries substantial levers for the ignition, air and throttle controls, the magneto and battery and coil ignition being controlled by one lever.

The following is an extract from the works test sheet: Duration of test, 12 hours at full load; average r.p.m., 950; average b.h.p., 20.6; maximum b.h.p., 22 at 1,005 revs. per minute; quantity of cooling water, 1.93 gallons per minute; temperature of cooling water at inlet, 65° F.; temperature of cooling water at outlet, 124° F.; minimum revs. per minute, 190 for 3.5 hours light, non-stop; minimum revs. per minute, 195 for 2 hours, non-stop, with a load of 1.63 b.h.p.; fuel used, petroleum, pure American; total quantity used, petroleum, 17 gallons; consumption per b.h.p., per hour at full load, .548 pint; lubricating oil, per b.h.p., per hour, .008 pint; bore, 3 3/4"; stroke, 5"; normal revs., 960; compression pressure 63 pounds.

Planning a Propeller.

The Fundamental Principles of Propeller Design Reduced to the Simplest Possible Terms.
A Practical Method Used in Laying Out the Screws for a Number of Prominent Boats.

By Henry C. Wright.

Part 1.

THIS absorbing topic has been the subject of investigation and experimentation for many years, with the result that a great deal has been written of a scientific nature, most of which is rather beyond the layman who is not a born mathematician.

It is the object of the writer to present in a clear and concise manner to the readers of *MoToR BoatinG* a few facts regarding the various designs and uses of propellers as applied to the latest practice of propeller construction.

The question always arising is: What size and type of propeller is best suited to my boat? The answer cannot be arrived at without considering, first the kind of boat; secondly, the horsepower and revolutions of the engine per minute; thirdly, the speed of the boat; fourth, the draft, and lastly, the shaft angle. These various elements depend largely one upon the other in the design and selection of an efficient propeller.

As I shall write upon those wheels which are best suited for motor boats, I can safely divide the various types of boats into four classes, namely, heavy cruisers, light cruisers, runabouts or semi-speed boats, and lastly, speed boats. As a foreword it must be stated that experimental results have pointed to the correctness of the theory that a true screw is the most efficient type of wheel yet designed for all classes of boats, with one possible exception, the hydroplane, where the revolutions are around 1,000 per minute, but the speed about 35 miles or more per hour. In this latter case an increasing pitch would be desirable.

Another very decided element of success is the accuracy with which the driving face of the wheel is planed to a true screw, and the correct location of the blades on the hub, so as to obtain a perfect balance without having to weaken either blade to compensate for the displaced location of weight.

It is also necessary to point out that the surface friction on the blades will cut down revolutions and thereby decrease the speed. It was for this reason that many English firms have their wheels nickel-plated after they had been buff-finished and polished all over, although they are built of high tensile strength manganese bronze. This policy has not been carried out over here, principally because buff-fining was considered good enough and also the rapidly increasing use of Monel Metal which is of extreme toughness, high tensile strength and does not erode. It is also susceptible of a highly polished surface, almost like silver

and I heartily recommend, for the highest perfection of strength and finish, for a strictly first-class propeller wheel, one built of Monel Metal which has been planed absolutely true and with both surfaces ground and polished all over.

The conditions under which a heavy cruiser labors are great displacement, beam and deep draft. The engine is usually called a heavy-duty type, which means a large unit of weight per horsepower and slow speed for large powers. It must also be borne in mind that the skeg and deadwood are quite thick, which prevents a clear flow of water after leaving the stern post. It is for this reason that the blades of wheels are tipped back from the normal line to the shaft so that the wheel will have a homogeneous body of water to push away and not one filled with eddies.

Now the logical conclusion derived from the foregoing statements suggest large expanded blade area with a low pitch, with the blade raked back about 9° or 10°, which is found to be alright in practice. The largest diameter possible consistent with pitch and surface give the best results.

But I am getting slightly ahead of the subject and we must inquire into the laying out of a propeller wheel so that the reader can understand at a glance just how a practical plan is constructed for the pattern maker's use. With that view in mind, the drawing was prepared and shows a wheel designed for a heavy cruising type of boat. This wheel is of the three-blade type, which is in such common use for the reason that vibration is greatly reduced over the old two-blade propellers, and the loss of one blade from accident is not so likely to wreck the engine.

The pitch of a propeller, by the way, may be defined as the actual theoretical advance of a screw in a solid medium for one revolution, and a right-hand screw, as one which advances forward when revolved to the right, or clockwise.

Having determined the size of shaft necessary to transmit the actual horsepower of the engine, allowing a sufficient factor of safety, the hub diameter may be found. This hub diameter is a varying quantity as most designers want a fair curve for the hub and strut, if there is one. But it must be large enough to have sufficient strength for the blades.

The next step is to determine the width of the blade at the hub, at the tangent line. This involves considerable mathematical investigation, as the revolutions, horsepower, number of blades, diameter of screw and thickness of blade at root, have to be considered. In other words, the cross-section depends upon the pressure normal to blades and the materials of construction. In ordinary practice, however, the thickness of blade at root equals .15 to .17 width of blade.

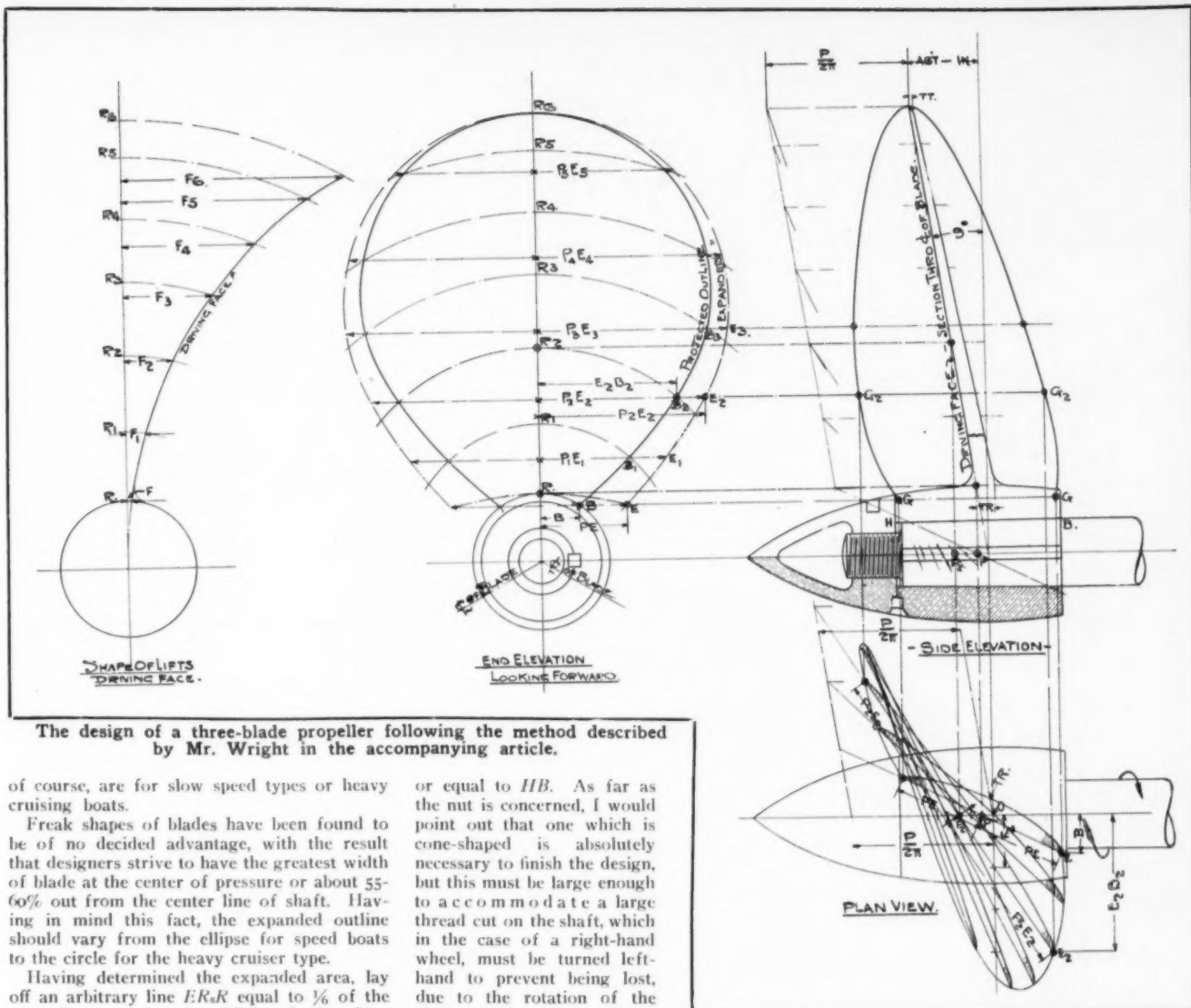
Having determined the width of blade and the angle of rake of 9° or 10° from the center of the hub, as shown in side elevation, next select a series of arbitrary radii spaced about equally or about one and one-half inches apart and describe arcs of circles. Project these radii to intersect the rake-back angle. Project these points downward to intersect the center line of shaft at points P, P_1 , etc.

It is now necessary to find the pitch lines through these points. In order to do this, divide the pitch of the wheel in inches by 6.283 and lay off at tip of blade and center line of

shaft, distances $\frac{P}{2\pi}$ — and connect points which are parallel to the rake-back line.

At the intersection of R, R_1, R_2 , etc. produced, draw pitch lines P, P_1 , etc. These lines will represent the various sections of the driving face taken through R, R_1 , etc. Lay off on P either side of shaft line half the width of the blade at root PE . Project E to cut center line of shaft at B . Lay off B on R and produce same to equal PE or half the expanded width of blade. E is the lowest spot through which the expanded outline will pass.

We are now concerned with the so-called surface ratio, which means the ratio of the actual expanded area of the blades to the actual disc area or the area of a circle of the diameter of the wheel minus the area of the hub. This surface ratio is the actual driving factor of the wheel and therefore naturally varies with the power and revolutions of the engine. For the four types of boats described, I would say that about 39%, 45%, 51% and 58% would be safe figures. The higher ratios,



The design of a three-blade propeller following the method described by Mr. Wright in the accompanying article.

of course, are for slow speed types or heavy cruising boats.

Freak shapes of blades have been found to be of no decided advantage, with the result that designers strive to have the greatest width of blade at the center of pressure or about 55-60% out from the center line of shaft. Having in mind this fact, the expanded outline should vary from the ellipse for speed boats to the circle for the heavy cruiser type.

Having determined the expanded area, lay off an arbitrary line ER_1R equal to $\frac{1}{2}$ of the 58% disc area for three-blade wheels. If a planimeter is not available for measuring this plane figure, it can be done by using Simpson's rule, which can be briefly stated by the equation

$$A = \frac{(x + 4x_1 + x_2 + 4x_3 + x_4) \times Y}{3}$$

where RR_1 is divided into 4 equal parts with perpendiculars x_1, x_2, x_3 , etc., erected cutting the trial boundary line. Y equals distance between ordinates, and A equals total area of plane figure.

Having found the required expanded area, we may proceed with the projection of other radii as before. P_2E_2 is laid off on P_2 and E_2B_2 is found. At one place on R_2 these two points lie in the same straight line R_2E_2 . Connecting these various spots, B_1, B_2, B_3 , etc., the projected outline is found for the end elevation.

Project P_2E_2 and E_2B_2 to intersect at G_2 , also PE and EB to intersect at G . Draw a line through various spots G, G_2 , etc., and the projected outline will result for the side elevation. Having thus obtained the contour of the blades in elevations, it remains to obtain the sectional shape. This is done by laying off the thickness of root TR on the hub, also the thickness of blade at tip, TT , connecting the points with a straight line. Lay off TR normal to P and draw a curved line through EME , allowing proper thickness at E , but finishing to a knife edge. Repeat operation for other sections and connect E, E_2 , etc., for the contour of blade in plan view.

Having thus projected the various outlines to obtain the finished blade, it remains to investigate the hub as regards length. It will be seen that the hub must be long enough to build a blade upon, or greater than GG , which is the projection of $2PE$. In usual types of wheels this is about $\frac{1}{4}$ inch longer than GG ,

or equal to HB . As far as the nut is concerned, I would point out that one which is cone-shaped is absolutely necessary to finish the design, but this must be large enough to accommodate a large thread cut on the shaft, which in the case of a right-hand wheel, must be turned left-hand to prevent being lost, due to the rotation of the shaft. The contour of strut, hub and nut should be a fair line to allow for a free flow of water, which greatly reduces eddying and gives the screw an unbroken medium to work upon. The taper of the shaft is usually given as $\frac{3}{4}$ " in diameter to the foot, which is satisfactory for standard wheels. One square key is the usual practice, of size about $\frac{3}{8}$ " for 24" diameter wheels.

As a matter of record, I wish to point out that the pitch lines P, P_1 , etc., already spoken of, are not actual straight lines but slightly curved, but as we are only interested in the outline of the blade, they are of no great importance. However, the shape of lifts of the driving face or a section through O normal to shaft line, can be made by setting off distance F, F_1, F_2 on R_1, R_2, R_3 and connecting points which will enable the workman to check up the wheel in this plane. Figured dimensions of PE, P_1E_1 , etc., also F, F_1 , etc., should be given the pattern maker.

Although comparatively little is said to be known about the screw propeller in general, I wish to state that better results can be obtained by the naval architect who figures out the various phases of the proposition mathematically and designs his propeller accordingly. The author has designed some fifty wheels, varying in diameters from 10" to 9', along the lines pointed out, with satisfactory results. The illustrations are borrowed from a series of wheels designed by Morris M. Whitaker for the Biddle Hardware Co., of Philadelphia.

By way of qualifying my remarks about the shape of a propeller blade, I wish to state that slightly rotating the center line of blade around the shaft tends to weaken the blade and such forms as the scimitar easily change the pitch

which is usually lowered, therefore defeating the design of a true screw.

The three-blade screw was considered because it is in such common use and therefore of greater interest to the public at large. Three-blade wheels produce very little vibration and in case one blade is broken, the danger of wrecking the engine is greatly lessened. Wheels of four blades are very efficient for towing and for many steamships, but a greater number of blades has been found to be useless.

The element of expense is also an important factor, in four-blade wheels, and therefore another disadvantage. As nearly all the larger wheels are made up in several pieces, in which the blades are bolted to the hubs with stud bolts, it very often follows that three or more blades cannot be fitted without greatly enlarging the hub and thereby increasing the friction, due to same. So far as built-up wheels are concerned practice suggests four-blade wheels for steamships, where reciprocating engines are used and three blades for torpedo boats and torpedo boat destroyers, although their use is far more reaching than the cases cited. In all the larger wheels a hexagonal nut is used on the tail shaft to prevent the wheel from coming off, but a cone-shaped fair water is fitted to complete the contour of the hub. This cap over the nut is made of the same metal as the hub, to prevent electrolysis and is designed to be watertight, to guard against corrosion of the shaft. A close fitting joint will suffice if the cap is set in red lead and tapped to the heel. Steel tail shafts have composition sleeves swelled on and designed to make a watertight joint with hub when it is sent home.

(To be continued.)

THE PRIZE CONTEST IN QUESTIONS AND ANSWERS

IT was with considerable doubt that we included the "long stroke" versus "short stroke" question in the October list answered in this issue. We confess we were a little afraid of it. We doubt whether the contributors to this department would respond enthusiastically to a theoretical discussion of this kind. But we were mistaken. Never, since the institution of the department, has such a question brought so many answers and such good ones, and never have we realized so thoroughly the value of this department for discussions of this kind. The "long versus short stroke" question is a live one right now, and the answers are great—read 'em over and see.

THE first two questions also brought a remarkable crop of answers, and in order to satisfy our conscience, we were forced to give seven pages to this month's contest. It's mighty hard to turn down good answers, and we suggest again that you try to keep your contributions within the 500 word limit, so that more contributors may be represented in the space available.

THE QUESTIONS FOR THE FEBRUARY CONTEST ARE THESE:

Describe and illustrate the best method of constructing a "fireless cooker" for use on a motor cruiser.

Suggested by "Amateur," Chicago, Ill.

What is the best method of covering decks and cabin houses with canvas, and how should the job be finished?

Suggested by L. R. Kelly, Philadelphia, Pa.

When you send in your answers, state what you will take if you win a prize.

Explain with diagram an ideal arrangement of the electrical equipment of a motor boat, showing method of wiring both ignition and lighting systems.

Suggested by P. H. Rippley, Melrose, Mass.

ANSWERS to these questions, addressed to the Editor of MoToR BoatinG, 381 Fourth Ave., New York, must be:

(a) In our hands on or before December 24. (b) not over 500 words long, (c) written on one side of the paper only, (d) accompanied by the senders' names and addresses. (The name will be withheld and initials or a pseudonym used if this is desired.) Questions for the next contest should reach us on or before the 24th of December.

THE PRIZES ARE:

For each of the best answers to the questions above, any article advertised in MoToR BoatinG, of which the advertised price does not exceed \$25, or a credit of \$25 on any article advertised in MoToR BoatinG, which sells for more than that amount.

(There are three prizes, one for each question, and a contestant need send in an answer to but one, if he does not care to answer all.)

For each of the questions selected for use in the next contest, any article advertised in MoToR BoatinG, of which the advertised price does not exceed \$5, or a credit of \$5 on any article advertised in MoToR BoatinG, which sells for more than that amount.

For all non-prize-winning answers published we will pay space rates.

How to Make a Cockpit Awning.

Eight Practical Covers of Several Different Types That Fit All Sorts of Requirements,
With Drawings and Complete Instructions for Building Them at Home.

THE PRIZE CONTEST—Answers to the First Question in the October Issue.

Quickly and Easily Furled.

The Prize Winning Answer.

THE arches (Fig. 1) are made of ½-inch standard iron or brass pipe, iron pipe sizes, bigger if necessary, depending on size of awning. They are bent with a camber so as to afford an easy drip, also to conform in appearance with the lines of the boat. The pipe can be bent of galvanized stock, if the radius at the sides (Fig. 2.) is not less than six diameters of the pipe. If bent to a smaller radius the galvanizing is liable to crack off and leave an ugly place that will quickly rust. If the pipe must be galvanized and a smaller radius is required, it may be made of black pipe and galvanized after bending. It is my opinion that a black pipe, cleaned and painted with a good black paint and allowed to dry hard, makes a nice looking job and can be retouched when the paint wears. The arches may be made with smaller lengths of pipe joined with standard pipe couplings, if desired.

The awning in Fig. 1 has three of these arches, and to make a stiff job there should be an arch every six feet. At the center of each end arch there is a standard tee, each intermediate arch if more than one has a standard cross. These take the center supporting and stiffening pipe "A" Fig. 1. The bases of the arches may be fastened to the deck and cockpit sides as shown in Fig. 1, by standard fittings which may be bought from any marine hardware house. The pipes may be screwed into these bases, but a thumb set-screw also makes a good job.

At the sides of each arch there is a ¼ in. or ⅜ in. ring-bolt screwed to the pipe by bolting or riveting through (see Fig. 5). The bolts receive the awning lashing. The awning may be made of white or khaki canvas No. 10 or No. 12; some prefer waterproof canvas; either makes a good job. The canvas may be cut to size by making paper templates or the measurements may be taken from the pipe frames. A scale drawing can be made if the boat is not yet built. The cover is made with 1¼ in. wide by ½ in. thick white pine, cypress or oak strips running the full length of the cover and fastened in the canvas, as shown in Fig. 3. These strips should be spaced on about 6-inch centers with one at each side and the middle. The side strips are to have galvanized shoulder eye-screws in them (Fig. 6) to take the lashings. The cover is to be fastened to the frame by rope passing through the eye-screws on the cover and the ring-bolts on the arches (Fig. 5). This makes an easy means of lashing and is very neat in appearance.

The advantages of this awning are: Accessibility and dryness of cockpit. Ease in furling and lashing (Fig. 4). May always be kept taught, shrinking being cared for by the lashings.

H. L. FULLER, Hampton, Va.

A Waterproof Awning.

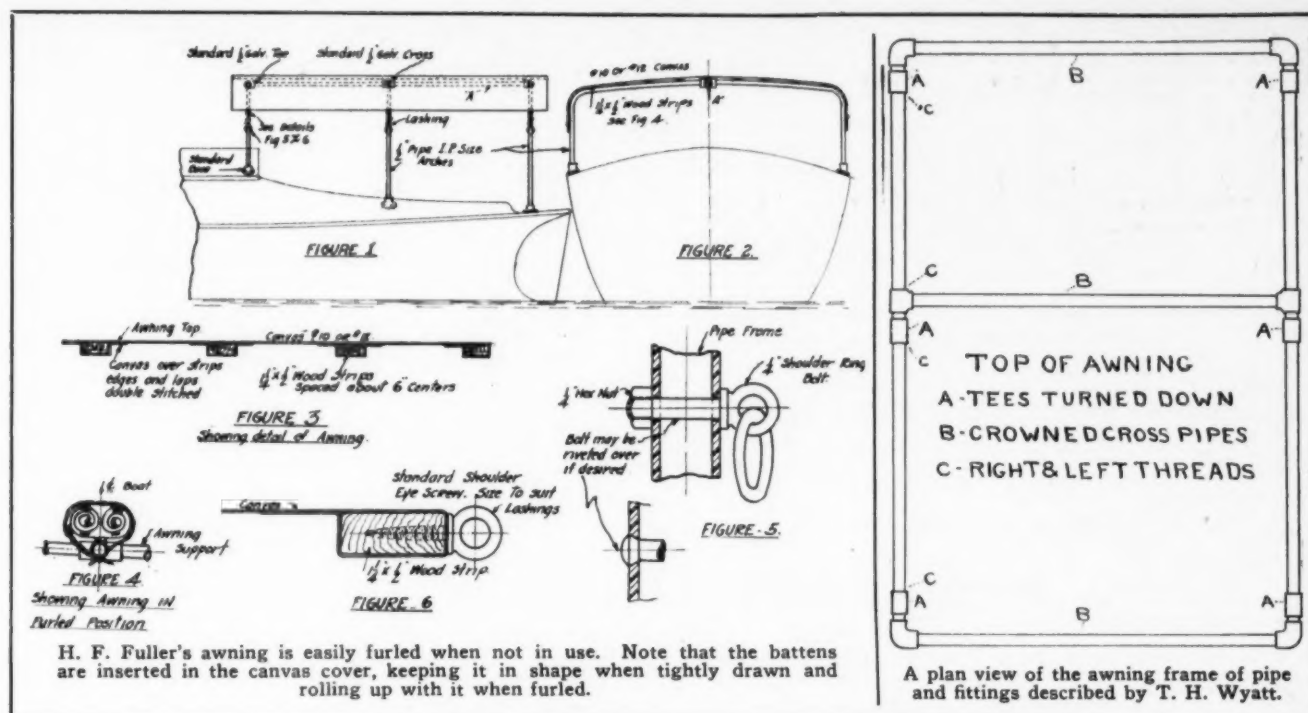
AN arrangement of ¾" galvanized iron pipe stanchions and fittings, with yellow pine battens running fore and aft, over which is a painted canvas cover, makes a substantial and serviceable awning for the cockpit of a cruiser, and is shown by the accompanying drawings. The advantage of an awning made in this way is, it can be taken down and stowed away, when necessary.

The frame consists of ¾" galvanized iron pipe uprights connected by ¾" galvanized malleable elbows to cross rails of ¾" galvanized iron pipe. The uprights are fastened to the plank-sheer and deck by means of ¾" floor plates, with four No. 14 flat-head screws in each plate.

No dimensions can be given, as the frame will vary in size according to the length and width of the cockpit to be covered, but the height should not be less than 6 feet, between cockpit floor and the under side of cross rails.

When the frame is erected, pine battens ½" x 2" are fastened to the top rails with No. 12-24 brass machine screws with flat heads. The battens are spaced about 12" apart on the widest rail, and the heads of the screws are countersunk flush with the top of battens, the pipe rails being drilled and tapped to receive the screws, one through each batten and rail.

The frame is then covered with No. 10 canvas, cut to shape, with a hem all around and



brass grommets inserted in the hem about 6" apart, so that side curtains, which are a great convenience, may be made and fastened to the awning, when necessary.

A good method of fastening on the awning is to drill a $\frac{1}{4}$ " hole through each stanchion, about 5 inches below the elbow, and drive in brass pins 2 inches long to which the awning is lashed. The fore and aft ends of battens are mortised into a cross batten $\frac{3}{8}$ " x 2" and secured with $\frac{3}{8}$ " wood screws, to which the ends of awning are lashed.

The canvas should be made waterproof and a good method follows: To $\frac{1}{2}$ gallon of paint add one ounce of yellow soap, dissolved in one pint of boiling water; paint this mixture on the canvas and dry for two days, then give the canvas a coat of paint without the soap mixture; this makes the canvas waterproof and pliable, and it will not crack when folded and stowed away.

JOHN CLITHEROE, Attleboro, Mass.

A Mildew-Proof Cover.

THE best and cheapest awning for the cockpit of a cruiser has a frame made of 3/4 in. galvanized pipe and pipe fittings, with the canvas top and side curtains mildew-proof. I give below the method used in constructing my own awning over a cockpit twelve (12) feet long and eight (8) feet wide.

The frame should have at least three uprights on each side, two forward ones to rest on the cabin roof. These uprights are simply pieces of galvanized pipe threaded at both ends, with pipe flanges screwed on where they are attached to the deck. Reference to the sketch will show how these uprights are attached to the main awning frame with tees. The uprights should be long enough to give head room when standing on the floor of the cockpit or bridge, if there is one. The pipes running across the cockpit should be "crowned" or bent upward, in order that the canvas top may shed rain. A sufficient number of hard pine strips about $\frac{1}{2}$ in. thick and 4 in. wide should be laid on these pipes, so as to run fore and aft of the boat, and attached by tinned or galvanized pipe clips placed on the under side. The wooden strips should be spaced about 10 in. apart, and must be varnished before putting on, or they will discolor the canvas.

The top should be one piece of 12-ounce canvas, if possible; if not, the seams should lap downward so as to shed water. If the top can be made wide enough to hang down over the sides, and thus cover the side curtains when they are rolled up, so much the better. It should be attached to the frame by lacing with light awning cord through grommets set in a flap sewed to the underside of the awning.

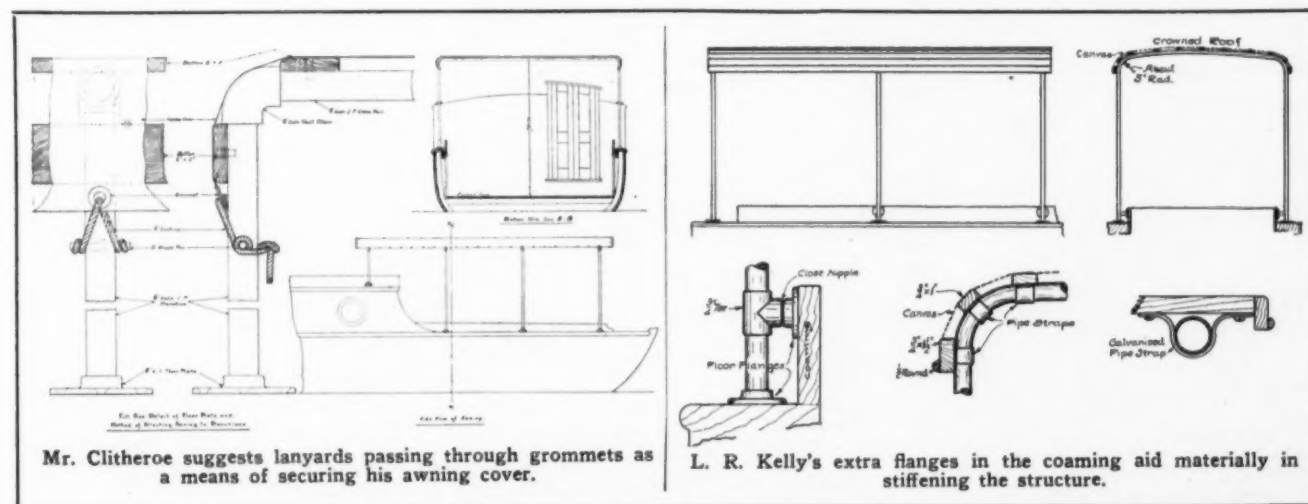
All canvas used should be made mildew-

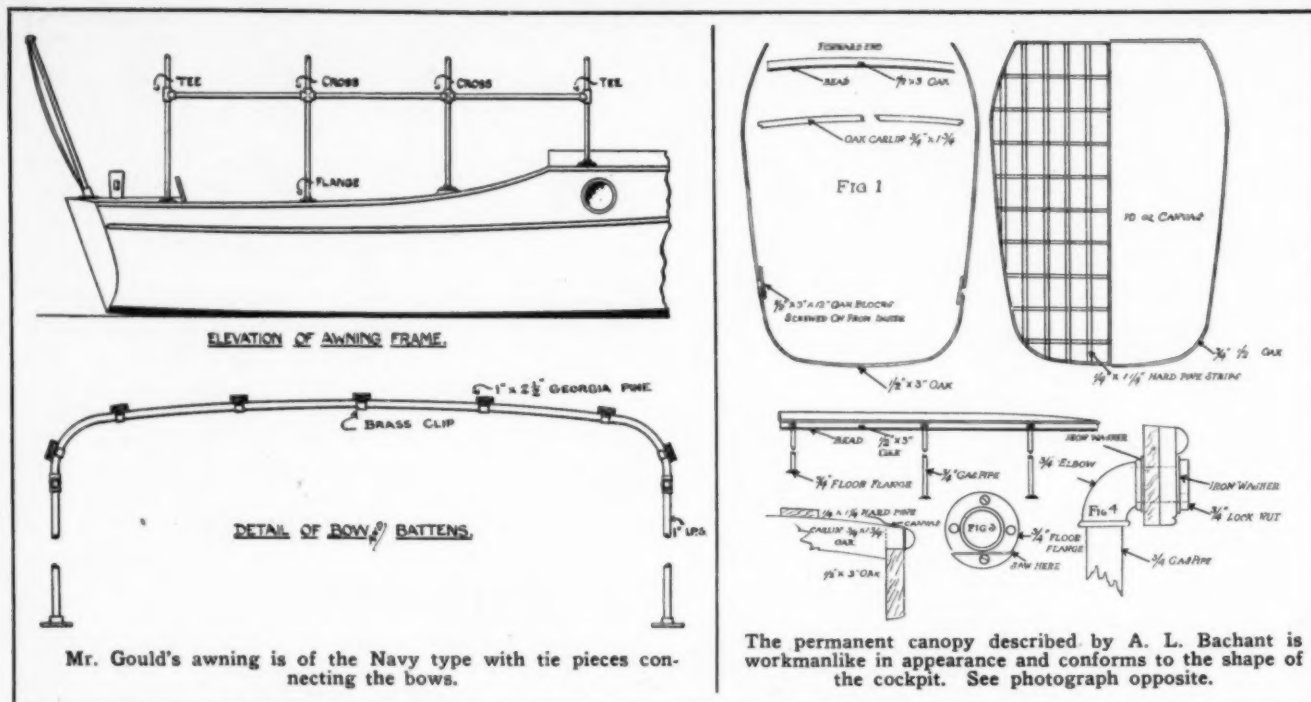
proof, and the following solution is very efficient. In one gallon of water dissolve $\frac{1}{2}$ pound of borax. In another gallon dissolve $\frac{1}{2}$ pound of sugar of lead. Let these two solutions stand over night, then mix them and add 10 gallons of water. After standing several hours, it should be stirred thoroughly and used. The best way is to dip the canvas into the solution and then wring it out; dry and rinse in clean salt water. If the canvas is already up, the solution may be applied with a brush.

As to the cost of this awning, the galvanized pipe frame of my awning cost \$4.40, including bending the three cross pieces to a six-inch crown. The canvas for the top (one piece) cost \$4.80, and for side, front and rear curtains (six pieces) \$3.50. As the cost of having the grommets set at a sail-maker's equalled the price of a gross of grommets, and a grommet set, I bought a set and put them in myself. T. H. WYATT, Winthrop, Mass.

An Awning for \$7.50.

THE supports on the awning shown in illustration are spaced from 3 ft. to 4 ft. apart, and are each bent from one piece of $\frac{3}{4}$ in. galvanized pipe. Where coaming can be used in addition to deck for securing these supports, a form of fastening consisting of two flanges, etc., is used. (See large detail illustrated.) Where deck only can be used,





then a single floor flange screwed to the pipe only can be used. The double flanges make the support very rigid. All fittings should be galvanized.

Straight grained oak strips form the supports for the canvas (which right here let me say should be 10 oz. waterproof) and are fastened to the pipes as shown with galvanized pipe straps, which when properly fastened will prevent the strips slipping along the pipe. These strips are all rounded on top edges to prevent cutting canvas and are spaced 6 in. apart at top, but closer on the curved ends or sides. The last strip on the sides holds the fastenings, for the canvas, which can be to suit; hooks, if canvas is wanted removable; or permanent fastenings as shown in illustration where canvas is put on to stay.

The ends are finished by a cross strip running across from side to side and fastened to each fore and aft strip. This strip is also shown in illustration.

A three-post awning of average height and width will not cost over \$7.50 for material if built by this method.

L. R. KELLY,
Philadelphia, Pa.

A Permanent Awning.

AFTER experimenting with different styles of awnings I constructed one which I find entirely satisfactory in every way. I first laid off on a floor the shape of the cockpit that I wished the awnings for. I then got three pieces of oak $\frac{1}{2}$ " x 3" x 12' with a bead run on one edge. These pieces I steamed and bent to the shape I wished the awning, bending one piece to make the after end (Fig. 1). When these pieces came to-

gether I put a block on the inside, fastening same from the inside with brass screws. For the forward end I cut out of $\frac{1}{2}$ " oak a piece 3" wide, the width of the awning, with a crown to match the crown of the cabin top. These I set one foot apart, across the side-pieces, dove-tailing the ends $\frac{3}{4}$ of an inch, leaving them flush with the top of the side-pieces. I then took some $\frac{1}{2}$ " x $1\frac{1}{4}$ " hard pine strips. These I nailed fore and aft across the carlin, spaced 7" centers. The ends of these strips I housed into the forward end piece, and also into the after end of the frame, but not into the carlin. Over these strips I stretched 10 oz.

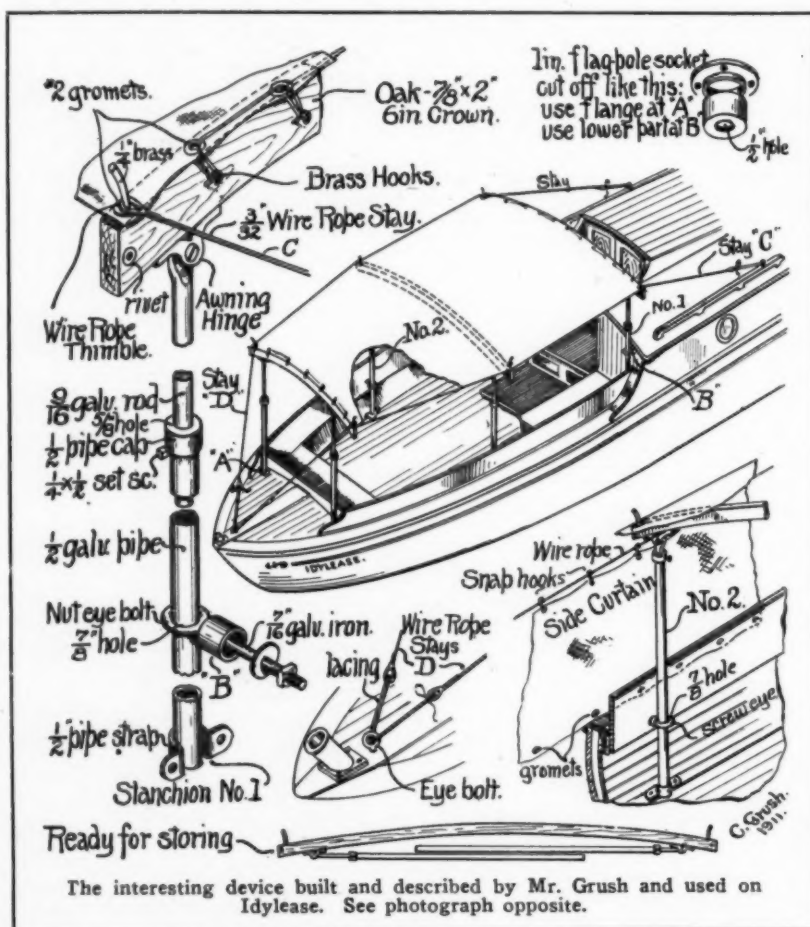
canvas, drawing it down tight and tacking to the outside of the frame, $\frac{1}{2}$ " from the top. After trimming off the canvas below the tacks, I bent around, over the tacks, a $\frac{3}{4}$ " x $\frac{1}{2}$ " round oak strip that covered the edge of the canvas. This canvas I waterproofed with paraffine, which made it watertight. I then got six cast-iron floor flanges fitted for $\frac{3}{4}$ " gas pipe. Four of these I cut with a hack-saw, making one side flat to set next to the cockpit coaming (Fig. 3.) Into these floor flanges I screwed $\frac{3}{4}$ " gas pipe for stanchions. On the top ends of the stanchions I screwed $\frac{3}{4}$ " elbows, and into these elbows I screwed $\frac{3}{4}$ " x 2" nipples

(Fig. 4). I then set the awning on the stanchions and marked on the frame where each stanchion came. At these points I bored a hole through the frame just large enough to allow the nipples on the stanchions to go through, first putting the nipple next to the elbow a large iron washer. After putting the nipple through the frame I put on another large washer, then screwed on a $\frac{3}{4}$ " lock nut. Where the nipples go through the frame I put a $\frac{1}{2}$ " x 3" x 12" block inside the frame, fastening same with brass screws from the inside. I made the top 3" wider than the coaming measured across; this allowed for the stanchions to be set up outside of the coaming. This made a very rigid awning.

A. L. BACHANT,
Traverse City, Mich.

The Awning of Idylease.

OF all the good things that ever happened on my boat, and contributed the most toward absolute laziness and rest, the awning was IT.



The interesting device built and described by Mr. Grush and used on Idylease. See photograph opposite.

This awning is especially adapted to the small cruiser but can in nowise be despised by the open boat.

The points in favor of my construction are: its slight resistance to wind, the ease with which the canvas can be detached and stowed as in a gale, means whereby the whole structure may be lowered for passing under obstructions, light weight, great strength, provision for taking the whole superstructure down without the aid of tools, and compactness for storing on board.

We lowered the top at night and put on the side curtains, which consisted of a single width of Government khaki (29"); this made everything snug and tight. Government khaki of which the cover was made was quite waterproof, and the color is quiet and in harmony with the varnish and prevailing boat tints, besides being easy on the eyes. I intentionally omitted the eternally flapping, scalloped border, and left that feature for perambulators and store fronts.

To the novice the following information may not come amiss: A 9/16" commercial iron rod comes something like 1/32" larger, then the galvanizing makes it larger still, so that a 5/8" hole is none too large to accommodate a 9/16" galvanized rod. Then, again, a 1/2" galvanized iron pipe is just a trifle smaller than 5/8" outside diameter, so that a galvanized iron screw-eye or eye-bolt with a 5/8" hole will just take the pipe. The hole in a half-inch pipe is .62" or, in round numbers, 5/8" (don't ask why), but it takes the 9/16" galvanized rod just right, and the combination, although a paradox, is ideal. Two flush flagpole sockets, 1" diameter, cut off as illustrated, will serve as deck plates where the stanchions go through the rear deck, and the bottom ends with a half-inch hole will serve as an exceptionally neat distance piece at B to keep the pipe away from the moulding on the bulkhead. I used a very short piece of 1/2" pipe, about an inch long, for the same purpose on stanchion No. 2 so as to make it stand plumb.

As for the cover this is made with a 2" hem around the outside and 2" shorter than the frame is lengthwise of the boat. Put No. 2 grommets where the brass pins come and 9" apart on the forward and after ends. No rope is necessary in the hem; now slip the grommets over the pins, and set up on the stays just enough to make the edges come taut, then lace the ends over the hooks. Do not strain the cover; it will stretch about 2" in a season. When not in use fold up carefully and place in a canvas bag made for the purpose, and your awning is good for at least four years.

CHARLES E. GRUSH, Beverly, Mass.

The Navy Type.

WHILE many forms of awning are in everyday use it is probable that the so-called "navy type," in which the top bows are crowned considerably and the ends bent down on either side to meet the stanchions, affords the maximum amount of protection combined with unusual rigidity and ship-shape appearance. The space between the canvas and the gunwale is less in this than in the flat-topped styles, while the well-crowned bows afford head room where it is most needed.

The entire awning frame, except the fore

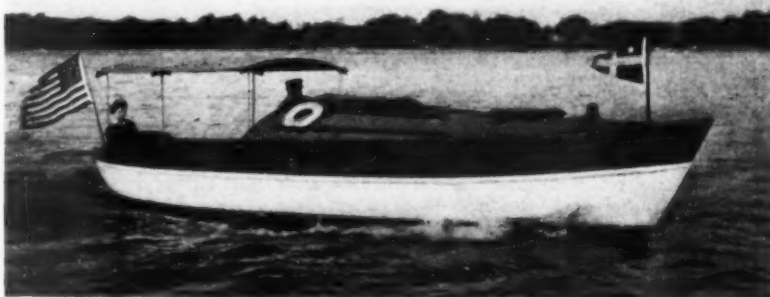
and aft battens, may be made up of standard galvanized iron pipe and fittings, one inch "iron pipe size" (1 5/16 in. outside diameter) being about right for average requirements. Four stanchions on a side are generally used for such an awning where a length of not over 10 feet is to be covered. The fittings required will be as follows: Eight floor flanges (to be secured to deck or rail to support the up-rights), four tees, four cross fittings, and perhaps four couplings or unions, if it is desired to make the bows of two pieces instead of one. Polished brass pipe and fittings may, of course, be used in place of galvanized, but they are not in any respect superior and are much more costly. Their only claim to consideration is their appearance (when kept brightly polished), hence we seldom see brass awning frames, even on expensive boats.

The most difficult part of building this awning frame is the bending of the four top bows to the required crown and bending down the ends on a comparatively small radius. It may be necessary in some cases to use ordinary

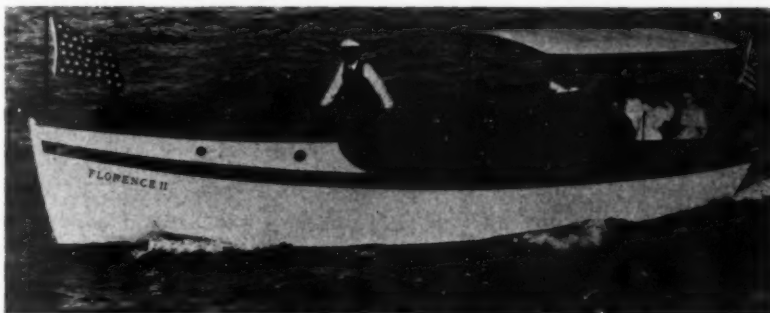
lefts. These fore and aft strands stiffen the whole frame wonderfully, and will also afford an excellent opportunity for lacing down the cover of 10 oz. khaki duck. After the pipe work is all in place five or more fore and aft battens of 1 in. x 2 1/2 in. Georgia pine, equally spaced, should be fastened on the outside of the top to support the cover without sagging. These should be fastened to the pipe bows at each crossing with flat brass clips bent into a U around the pipe and flattened against the batten to receive a countersunk brass screw on each side. A countersunk machine screw must also be used to fasten the clip to the pipe to prevent its slipping out of place. When the canvas cover has been tightly laced over all and side curtains fitted for use in bad weather our awning may be considered complete.

An awning of this construction must have straight sides but it may be wider at the forward than at the after end, or *vice versa*. It is perhaps not the cheapest style to build, but it is a most serviceable type, being good for many years of hard usage.

ALLAN O. GOOLD,
Portland, Me.



The awning described by Mr. Grush as it appears on Idylease, the boat he built from Pioneer frames.



Mr. Bachant's permanent awning installed on his cruiser Florence II.

wrought-iron pipe so that it may be heated when bending down the ends and then galvanized afterward.

The bottom flanges being the foundation of the whole structure should be as strong and securely fastened as possible, stove bolts being preferable to screws for this purpose wherever there is an opportunity to set up the nuts from underneath. In erecting the frame the bottom flanges should first be fastened in place, being levelled up on wooden filling pieces when the supporting surface is slanting. The tees and crosses must next be screwed on to the threaded ends of the bows, the tees being screwed on the two end bows, and the crosses on the two middle ones. Then each bow should be held up in position and the upright pipes screwed into the bottom flanges and the bottom outlet of the tee or cross simultaneously, the threads being right and left. When both uprights are in place the bow will stand alone. After all the uprights and bows have been erected we are ready to screw in the lengths of pipe which join the tees and crosses along the tops of the uprights, fore and aft. The uprights will easily spring apart enough at the top to allow these lengths to be placed in position to catch the threads, and they may then be screwed into place with a Stillson wrench; these threads also being rights and

across the top of each, placing the first hole just under the bend of pipe on side. Next, erect pipe and fasten to coaming with galvanized awning sockets or pipe fasteners, and to floor of cockpit and cabin roof with galvanized floor plates.

Now, for slats on top, are needed some oak pieces 1/2 x 3 inches, and the length awning is to be. These should be spaced about four inches apart on front support, but will be somewhat closer together in rear, because of the narrowing cockpit. This must be borne in mind in drilling the holes.

Give slats two coats of good paint and fasten in place with 3/16 inch galvanized boat rivets. You then have complete the strongest kind of an awning framework. Get some No. 10 canvas and waterproof by alum and lead process and cut to required shape, allowing for a two-inch hem all around. Sew a six-inch strip of canvas lengthwise down the center and then place brass grommets or rings twelve inches apart on sides and down the center. Side and end curtains, if desired, can be made in a similar way.

This gives us an awning that affords thorough protection from sun and storm and that can be easily taken in when the blow comes. The cost is low.

B. BREWSTER, Washington, D. C.

Simple, Strong, and Easy to Build.

THE best awning for a raised deck cruiser is the one that is simplest, strongest, and easy to build.

The stanchions and top of this are made from one piece galvanized iron pipe, bent to shape. This can be bent very readily by boring a hole in a heavy plank a size larger than pipe. Set plank slanting against building, insert pipe to proper place and bend down. By gradually working pipe in a very neat job can be done.

For the ordinary cockpit, three of these pieces are sufficient, but be sure and place the forward set at least eighteen inches forward on the cabin roof. This keeps the sun from helmsman's eyes.

After cutting the sets of stanchions and bending to shape, drill a series of vertical holes, 3/16 inch,

Truing a Bent Propeller.

Several Ways of Bringing a Bent Propeller Blade Back to Its Original Pitch.
Emergency Methods that are Easy of Application When the Repair Shop is Not Available.

THE PRIZE CONTEST—Answers to the Second Question in the October Issue.

How to Use Templets.

The Prize Winning Answer.

TO true up a propeller proceed as follows: Secure a block of wood three or four inches longer than the diameter of the wheel, and having a plane surface.

With dividers strike off a circle the diameter of the wheel. Strike off two more circles, thus dividing the radius into three parts. If the wheel is a large one arcs only may be used on one side only. At the center mark set up a perpendicular upon which the wheel will just slide. Drive a nail through the perpendicular so that the ends of the blades will clear about one inch and put on the wheel, driving surface down. The driving surface is the straight side which goes aft on the shaft.

Assuming that the wheel has been trued as nearly as possible by sighting, you are ready to commence operations. See figure.

If one blade is not bent make a templet of seven-eighths or inch pine, having one square edge. The templet will be triangle-shaped, fitting the blade angle. In fitting place the base so that the ends just hit the circumference of the arcs. Make the outside one first and mark it. A brad may be tacked through the point to hold in position. With the wheel in same position fit the other two and fasten as shown.

Raise the propeller and turn so that the injured blade will come over the templets. Now you can readily see where the blade is out.

Concerning straightening: Hold the blade face (straight or driving surface) down on an anvil or flat piece of iron, and strike, lightly at first, until the strength of the metal is found. Then don't strike too hard or the blade will stretch. The blade will curl up at the edges if struck in center. Use this fact for a guide.

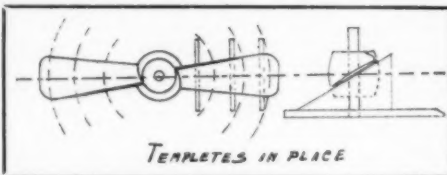
The face of blade should present a true, even surface and the leading edge should be straight. Replace on perpendicular and try with templets. If not true repeat hammering and try again. Bend the blade only a "hair" at a time and it will soon true up. Then file down any ridge or hammer marks that may have been made in straightening. While the file is working sharpen up the edges, mainly the leading edge, filing only from the rounded back. W. B. MOORES, Newburgh, N. Y.

To Correct the Pitch.

ABENT propeller blade is a rather difficult proposition if the truing up is to be done so that the bent blade will be exactly like the blades that are not bent, but it can be done if care and patience are used.

Lay the bent propeller on a flat board with the faced-off side of the hub down. If neither side of the propeller is faced off make a taper pin of wood and drive into a hole in the board with the taper end up so the propeller will fit over it. Now mix plaster of Paris with a fairly thick paste and build up from the board under one of the good blades, which has been rubbed with oil, so that when the plaster has hardened and the propeller is lifted off an impression of the good blade is left. It may be necessary to build a cardboard box around the blade before the plaster is poured in to hold it while it hardens. The impression will show the pitch of one blade at all points. Now place the propeller on the board again but with the bent blade over the plaster mould, and you can readily see how the blade should be bent to match the good one.

The method of bending depends entirely on the nature of the bend. Some part may be



Method of applying the wooden templets suggested by W. B. Moores.

straightened by placing between the jaws of a vice and closing the vice, some by hammering with a wooden maul. To change the pitch slightly place the blade in a vice and insert an iron bar in the shaft hole and use it as a lever. Take care not to put too much pressure on the bar at first as the bronze in the blade is likely to yield suddenly.

If the blade is bent at the hub and only the pitch changed a wooden wedge may be cut to fit under a good blade and used instead of the plaster of Paris. If all blades are bent so there is no sample to work by it will be difficult to obtain the correct pitch, but a wooden wedge can be laid out and cut by remembering that the pitch of a propeller is the distance in inches that would be traveled by the propeller in one revolution if revolved in a solid medium (i. e., where there was no slip as there is in water); for example, if the pitch was 20 in. draw a horizontal line as long as the circumference of your propeller ($3.1416 \times$ the diameter) and another line at one end of and at right angles to the first, projecting 20 in. (the pitch) above it. Now connect the ends of these two lines and make your wooden wedge to fit the angle that this last line makes with the horizontal line and use this wedge on the board to measure the pitch as described elsewhere in this article.

KATHERINE EDWARDS, Winthrop, Mass.

A Wooden Form.

A FAIRLY good job can be done on a bent propeller if one of the blades is uninjured or if another propeller of similar design be available for a pattern. Lacking these, the best way is to straighten the least injured blade as much as possible and use it for the pattern.

Remove propeller from shaft and fit a peg to the bore, then mount the peg on a board with a block to keep the propeller clear of the board. Now take a block of soft wood and fasten to the board under the propeller blade, having block thick enough to touch the highest point of blade when propeller is placed on peg. Now with a draw-knife or chisel cut down top of block till propeller blade touches it everywhere when placed on a peg. Now draw a circle the same diameter as propeller and mark into thirds in the case of a three-bladed propeller, and placing the propeller on the center of circle see if blade tips are equidistant. If not bend the worst injured blades till they line up with marks on circle. In the case of a two-bladed propeller lay a straight edge from the center of one blade tip to the center of the other and straighten blades, if necessary, till straight edge bisects bore of propeller.

Now, straighten each blade with a mallet on a bench or sandbag until each blade fits block perfectly when placed on peg.

The foregoing seems like a great bother over a small matter, but it would be much better to put on a new wheel than one half straightened which would shake your stuffing-box loose with its vibrations.

EDW. E. HEERMANCE, Hudson, N. Y.

An Emergency Method.

A METHOD of truing propeller blades, that have become bent, to be of practical value should be capable of application in an emergency; that is, when the boat is out of touch with repair shops and the only available tools are those on board.

The following method fills these requirements and is one I have seen used with considerable success:

Remove the propeller from the shaft and place it on a flat board surface, larger than the diameter of the propeller, with the driving face down. Fit a plug in the shaft hole and fasten it to the board with a nail or screw in such a manner that the propeller will revolve around it as an axis but without any play.

It very seldom happens that all the blades are bent at the same time upon striking an obstruction, so, selecting the blade that appears to be uninjured, fill in between it and the surface of the board a quantity of stiff clay or wet sand sufficient to cover its whole face. Raise the propeller from its axis, taking care not to disturb the mould, and revolve it until one of the injured blades is over the mould. Then let it down gently and notice where it fails to conform with the mould; then with the aid of a copper or fiber-headed hammer and a solid block it may be made to fit the mould, trying it as you go along to see where it needs bending. Repeat for all injured blades and you are sure that all blades are alike on finishing.

If the blade is very badly bent it should be straightened as nearly as possible with hammer and pry before applying to the mould.

If all the blades happen to be bent bring one back as near to its original shape as possible, with the eye, and then make the mould and bring the other blades to this shape. The wheel may not be exactly the same pitch as originally but all blades will be the same shape, which is the most important thing.

J. L. PATTON, Everett, Wash.

Don't Forget Spacing of Blades.

ASSUMING that the job is to be done without the convenience of a machine shop and with only the use of a vise, monkey-wrench, hammer and such tools as ought to be at hand, this is a method that I have used in a great many cases and found to be very successful:

First, take a good solid piece of plank surface as large as diameter of wheel to be trued, plane true on face, bore hole in center and insert pin to fit bore of propeller; place propeller on pin and bring each blade an equal distance from surface of plank or plate and then if wheel is three-blade have three lines drawn from center of pin to outside of surface, dividing equally. Bringing the blades correctly over these lines will bring the wheel back into an equal tripod and even balance. Of course, in a two-blade wheel, a straight line drawn through the center and the same method followed out will bring it back in shape again.

To correct the pitch or lead of the blade, take a piece of tin or stiff cardboard, cut at an angle to fit pitch of blade that is nearest to original shape, place base of angle on surface of plank or plate and bend blades to fit angle templet. A propeller handled in this way, if not too far gone so that it will break in truing, may be made practically as good as new.

FRANK TURNER, Rochester, N. Y.

"Long Stroke" vs. "Short Stroke."

All Phases of the Much Mooted Question Considered by the Readers of MoToR BoatinG.
Excellent Discussions of an Important Subject that is Not Generally Understood.

THE PRIZE CONTEST—Answers to the Third Question in the October Issue.

Bases Discussion on Piston Speed.

The Prize Winning Answer.

IN a discussion of the relative merits of long and short stroke marine explosive motors, such factors as whether of slow or high speed type, and class of vessel driven, must be considered.

Motor driven vessels might be divided into three classes, each having its high efficient limit of propeller speed, approximately as follows:

1. Heavy commercial boats and heavy sea-going cruisers, 500 r.p.m.
2. Open general service boats and medium weight cruisers, 750 r.p.m.
3. Very light speed boats, 1,000 and more r.p.m.

Inasmuch as direct drive is practically always employed in motor boats, the propeller speed governs the motor speed in an efficient installation.

Engineers concede that the internal combustion motor has a most efficient piston speed of 1,000 feet per minute, or possibly 1,200.

As a logical basis of computation, assume average motors operating in the most widely used types of class two, above stated, combining seaworthiness and speed, but sacrificing neither quality to the other.

The most efficient propeller speeds of such boats range from 400 to 750 r.p.m., and cylinder bore from four to six inches, with stroke approximately equal to the bore.

The piston speed ranges of such cylinders at the speeds stated is about 300 to 500, and 450 to 750 feet per minute, respectively. Therefore, in only the larger cylinder at unusually high r.p.m., does the piston speed approach the point of highest efficiency.

There are two, and only two, methods of increasing the piston speed, viz.:

1. Increasing the r.p.m.

2. Lengthening the stroke with same r.p.m.

The first is objectionable because it would increase the propeller speed above the point of greatest efficiency, waste power, increase depreciation and decrease reliability, thus decreasing the efficiency of the motor boat as a unit.

The second is acceptable as it would retain the presumably most efficient propeller speed, increase the efficiency and economy of the motor without materially increasing its depreciation or lowering its reliability, thus resulting in increased general efficiency.

Lengthening the stroke inordinately is not advocated, as that would present great difficulties in construction, starting, control, vibration, etc.; but only to a point from 30% to 45% greater than the bore.

In high powered motors for speed boats, where high propeller speeds are efficient, and economy and low depreciation are sacrificed for speed, the comparatively short stroke may be highly desirable, for, to keep the piston speed of a six or eight-inch bore cylinder at or near the most efficient point at 1,000 or more r.p.m., the stroke must be approximately six inches—comparatively short.

In motors for use in class one boats, where most efficient propeller speeds are low, and reliability and economy desirable and necessary; the stroke must be even longer, proportionately, than in the motor for average service, if the piston speed is maintained at or near the most efficient point.

It is readily apparent that no general rule can be laid down, for obviously the same motor cannot be adapted for heavy cruisers and working boats that is best suited for high

speed racing craft, and *vice versa*. Summed up, the situation is as follows:

For motors of average size used in class one and two boats (including probably nine-tenths of all boats) the "long stroke" is preferable. In high speed motors for use in speed boats, the comparatively "short stroke" may be preferable.

L. V. B. GRAY,
Austin Station, Chicago.

Both Types Have Advantages.

JUDGING an internal combustion motor upon the following considerations: Installation, accessibility, noise and vibration, first cost, weight, maintenance and efficiency, we shall find:

As regards installation, a long stroke motor tends to be shorter, wider and higher than a short stroke motor, and usually requires a greater shaft angle.

The experience of automobile manufacturers shows no advantage to either as far as noise, vibration or accessibility are concerned, but indicates that in regard to weight and first cost there is a slight difference in favor of the short stroke motor.

For marine purposes the motor must be considered in connection with the propeller it drives, to gain any true conception of efficiency. Very generally speaking, it is true that the best propeller is that which acts upon the greatest body of water at the lowest speed. Some constructors have adopted piston speeds as low as four hundred feet per minute, and with excellent results, but such speeds mean great weight for the power developed. It is evident that high piston speed means motor efficiency, and decreases the weight per horsepower. The long stroke motor enables the designer to combine high piston speed with comparatively low rotative speed, or, in other words, an efficient motor of reasonable weight and size with an efficient propeller.

Comparing motors of equal cylinder capacity and compression, it will be seen that if the bore, and consequently the piston load is the same in each, the rotative speed will be less in the long stroke motor for the power developed; or if the rotative speed is the same the load will be less.

A crank of short throw, in proportion to the diameter of shaft and pin, will absorb more power in friction than one of longer throw proportionately; the limit being reached in what is called an eccentric, where the friction loss is usually so great that it would be inoperative as an engine crank. This accounts for the heating and extreme wear of some bearings which appear large enough for their work.

The short stroke motor has less heating surface in proportion to cylinder capacity, with less heat loss to the jacket; but, judging from the general adoption of the T-head type of motor, with very large heating surface, this does not appear very important.

In few words: It would seem that the advantages of the short stroke motor are lower first cost and weight, lower center of gravity, less width and height, and a more efficient shaft angle in some cases. The long stroke motor is shorter, somewhat more efficient and usually more durable, and drives a more efficient propeller.

The short stroke motor should do its best work in light high speed hulls, and the long stroke motor in cruising or commercial installations, where a high center of gravity is usually an advantage.

E. B. CHURCH, Boston, Mass.

Long Stroke More Economical.

THERE is no fixed rule by which a long stroke motor may be differentiated from a short stroke motor, but if the ratio of stroke to bore is more than 1.2 it may be correctly termed a long stroke engine. If any less than that it ought to be considered a short stroke engine.

This latter type is a lighter weight engine for its power than the one of longer stroke. Therefore, it finds its field particularly where lightness of weight is an important factor, as in racing boats, aeroplanes, and high speed motor boats. With the same piston speed it will turn up more revolutions per minute, consequently getting more power strokes in a given time. These power strokes will also have a higher mean effective pressure since the gas is not expanded to as low a pressure as in the long stroke motor.

It can be readily seen that the long stroke must be heavier than the other type upon considering the alterations that would be necessary in changing from a short to a long stroke. The crank would have to be lengthened, the connecting rod lengthened, and the cylinder lengthened, all of which means additional weight. On the other hand, the engine with a longer stroke in proportion to bore is longer lived and helps considerably toward an easy riding boat, since it is freer from vibration.

Revolving weights can be easily balanced, but it is impossible as far as practicability is concerned to even approximate a balance of the reciprocating parts in any less than a four-cylinder engine. Most of the marine engines built have less than four cylinders. It is an important matter, therefore, to keep down the inertia of these unbalanced reciprocity weights since the cause of vibration lies there. This inertia increases directly as the weight of the reciprocating parts and as the square of revolutions. An increase in the rotary speed is thus much more detrimental than even a proportionate increase in weight. It should be noted though that the only increase in weight of the reciprocating parts, necessary in lengthening the stroke, is that increase in one-third of the connecting rod, since only that much is considered reciprocating.

The higher speed short stroke engine is not only objectionable because of its greater vibration but it is at once apparent that an increase in rotary speed will result in faster wear of bearings, cams, etc. These are the vital parts of an engine and upon their life depends the life of the engine.

The argument for the long stroke engine that has the most weight is its economy. This economy results directly from its farther expansion of the charge. The short stroke motor must necessarily exhaust before the piston has traveled as great a distance as that of the long stroke motor. Work is the product of a force times the space through which it travels. An engine will exhaust at about 30 lbs. above atmosphere and considering this pressure behind a piston of, say, 40 sq. in. will mean a force of 1,200 lbs. If this force could be utilized by an inch or two more of piston travel it would represent power that would be an absolute gain with the use of no more fuel.

This gain in power, of course, will vary with different sized engines, but experiments will show it to be about five or six per cent. The additional weight of a long stroke motor is not of much importance in the majority of boats. Its increased economy is a big item and one that will appeal to all owners, par-

ticularly those who use their boat for business purposes. HAROLD A. ROBINSON, Coldwater, Mich.

Thermal Efficiencies About Equal.

AS the marine engine is designed to run continuously at maximum speed, the claims of great flexibility for the short stroke motor, and high torque at low speeds for the long stroke motor, often urged by automobile manufacturers, hardly concern the average motor boat owner.

The thermal efficiencies of the two types of engines are about equal, for what the long stroke engine loses in its large cylinder radiating surface, it gains in its more compact explosion chamber.

The chief advantage of the short stroke engine lies in its low weight per horsepower. Because of its lightness, it is best adapted to hydroplanes and fast runabouts, where every pound of weight saved means more speed.

Its high rotative speed and low torque are advantageous to high speed boats, as the small shaft, strut and propeller required, mean little energy wasted in driving these parts through the water.

The small crankcase and propeller of the short stroke engine enable the shaft to be placed with a small downward angle, so that the thrust of the propeller is nearly all forward.

The long stroke engine secures at the expense of lightness and compactness, a two-fold economy: saving of fuel and freedom from repairs. These economies are brought about by the low rotative speed possible.

The slower speed effects a saving of fuel, because it results in a more homogeneous charge, and enables the combustion and scavenging to be carried out more slowly and efficiently.

It saves wear and tear on all parts, owing to the fewer reversals of motion. Particularly on the reciprocating working parts is wear saved, because the stresses in these are proportional to the square of the number of revolutions per minute, and only directly proportional to the length of stroke.

The long stroke engine is especially suitable for commercial boats and large cruisers, where economy of operation and freedom from repairs are desired. On long cruises the greater weight of a long stroke engine may be more than saved in the smaller weight of gasoline needed.

The long stroke engine should be used, only in fairly deep boats, otherwise the height of the crankcase, and the large size of the propeller, might cause an excessive shaft angle.

For the ordinary family launch or cruiser an engine with a stroke of from 1.1 to 1.35 times the bore is best. This has not the light weight of the short stroke engine, or the economy of the long stroke engine, but on the other hand, it has the disadvantages of neither. Its speed is not unduly high, its crankcase and propeller are not so large as to require a steeply inclined shaft, it is fairly economical, and, if well made, should have a long life. It is deservedly the most popular type of marine engine.

WARREN ORDWAY,
Newton Center, Mass.

Favors "Long Stroke."

FOR marine purposes, as well as for all other purposes to which an internal combustion engine is subjected, the "long stroke" type of engine has decided advantages over the "short stroke" type. For it can be claimed less weight, greater fuel economy, longer life, smoother running and less noise.

Take, for example, a single-cylinder, two-cycle marine engine, 4½ inches bore x 4½ inches stroke, developing approximately 5 h.p. at 500 r.p.m. By increasing the stroke to 6 inches we increase the power of the engine about 25 per cent., the revolutions remaining the same and the weight only increasing about

5 or 10 per cent. In the first case we have a piston speed of 375 feet, and in the second case a piston speed of 500 feet. The question will now be asked, why not increase the piston speed of the short stroke engine to that of the long stroke one? By doing this the same effect will not be obtained, for more power will be required to drive the engine; and, again, the increase in r.p.m. is objectionable in many cases, especially when the engine is of the heavy duty type.

For a given horsepower, the long stroke engine has a smaller cylinder diameter, and as the initial pressure per square inch on the piston head is practically the same for both types of engines, the total pressure on the piston head and the shock caused by the quick expansion of the gases at the beginning of the stroke will be less in the engine with the smaller diameter on account of the crank.

In the long stroke engine the side pressure of the piston on the cylinder walls is less than in the short stroke engine, but as the piston speed is greater, the loss will be about the same in each case.

The thermal efficiency of a long stroke engine is greater, due to the reduced cylinder diameter, and consequently less wall area of the compression space. Hence, we have a higher mechanical efficiency. Compression can be carried higher in the long stroke engine than in the short stroke one, without any bad effects.

In the long stroke engine the gases are expanded more; consequently, less heat will be carried off through the exhaust. Again, as the r.p.m. for a given piston speed is less for the long stroke engine, smoother running and less noise will be obtained, as the noise must necessarily increase when the engine is running at a greater number of revolutions per minute.

Opinions differ as to the proper length of the stroke, but engines with a stroke relation to bore of from 1¼ to 1½ will show a decided increase in mechanical efficiency over engines with the short stroke.

Of course, the short stroke engine has its champions, who claim that the long stroke engine is heavier; that they have greater side pressure of the pistons on the cylinder walls, and that they do not allow offsetting very much; but notwithstanding their claims, the short stroke motor is gradually giving away before its long stroke opponent, and even in the automobile field, the manufacturer points with pride to the long stroke feature of his engine.

J. B. S., Norfolk, Va.

The Advantages of High Piston Speed.

THERE has been a great diversity of opinion and plenty of claimed advantages in both types of engines and in the various discussions of the relative merits, either one or the other, was pronounced to be the right motor, while the readers were expected to accept everything as a fact. This is an extremely broad subject and as the allowed space is limited, the comparison has to be made in a very condensed form. I will endeavor to compare both types as to their mechanical advantages, heat efficiency and general utility. The principal components which help to make a good and efficient engine are: Heat efficiency, mechanical efficiency, wearing qualities, general design.

Long practical experience has taught me to advocate high piston speeds, the same having a direct effect upon economy. Now, there is no reason whatever why the short stroke motor does not lend itself as readily to piston speed as the long stroke machine. Out of the total amount of heat generated at every explosion as much as possible is to be converted into work. Unfortunately the temperatures are so high that it is necessary to water-cool the cylinders to prevent overheating of the various parts, which in turn would also cause premature firing, approximately 33% of heat is wasted, while another 40% is carried off with the exhaust, leaving between 20 to 30% to be

converted into actual work, depending upon the proper design of motor.

Directly bearing upon heat efficiency are: compression, piston speed, ignition timing, valve timing, sizes of valves for calculated speeds and maximum output of power.

Suppose we have two engines of the same power:

Short Stroke.	Long Stroke.
Cylinder diameter, 5 in....	Cylinder diameter, 5 in.
Short stroke, 5 in.....	Stroke, 9 in.
Revolutions, 900.....	Revolutions, 500
Mean piston speed, 750 ft.....	Piston speed, 750 ft.
Cylinders.....	Longer
Piston.....	Longer
Crank shaft.....	Heavier, due to greater torsion
Connecting rod.....	Heavier, greater bending moment.
Size of valves.....	Same
Crank case.....	Larger
Flywheel.....	Larger
Compression.....	Same
Heat losses.....	Same

From the above we at once see that outside of the lower revolutions, there is no marked difference between the two types, on account of the piston speeds being the same.

Compression, depending upon the construction of the combustion chamber and temperature of cooling water can be carried to the same point in both motors. The heat losses would be about the same in either engine, and if proper care is exercised as to the lubricating system, frictional losses would not differ greatly. Beyond doubt much greater care is required in designing and manufacturing of the high speed machine, as any inaccuracy in timing of valves and ignition would effect the efficiency immediately.

The long stroke engine, will without question, show better lasting qualities, due to slower moving parts; on the other hand, with the special alloys now within reach of every manufacturer, the high speed motor will stand up well for the work designed, viz.: "speed," and for the heavy cruiser, the long stroke machine has its place.

L. A. MERK,
Pittsburgh, Pa.

Tendency Toward "Long Stroke."

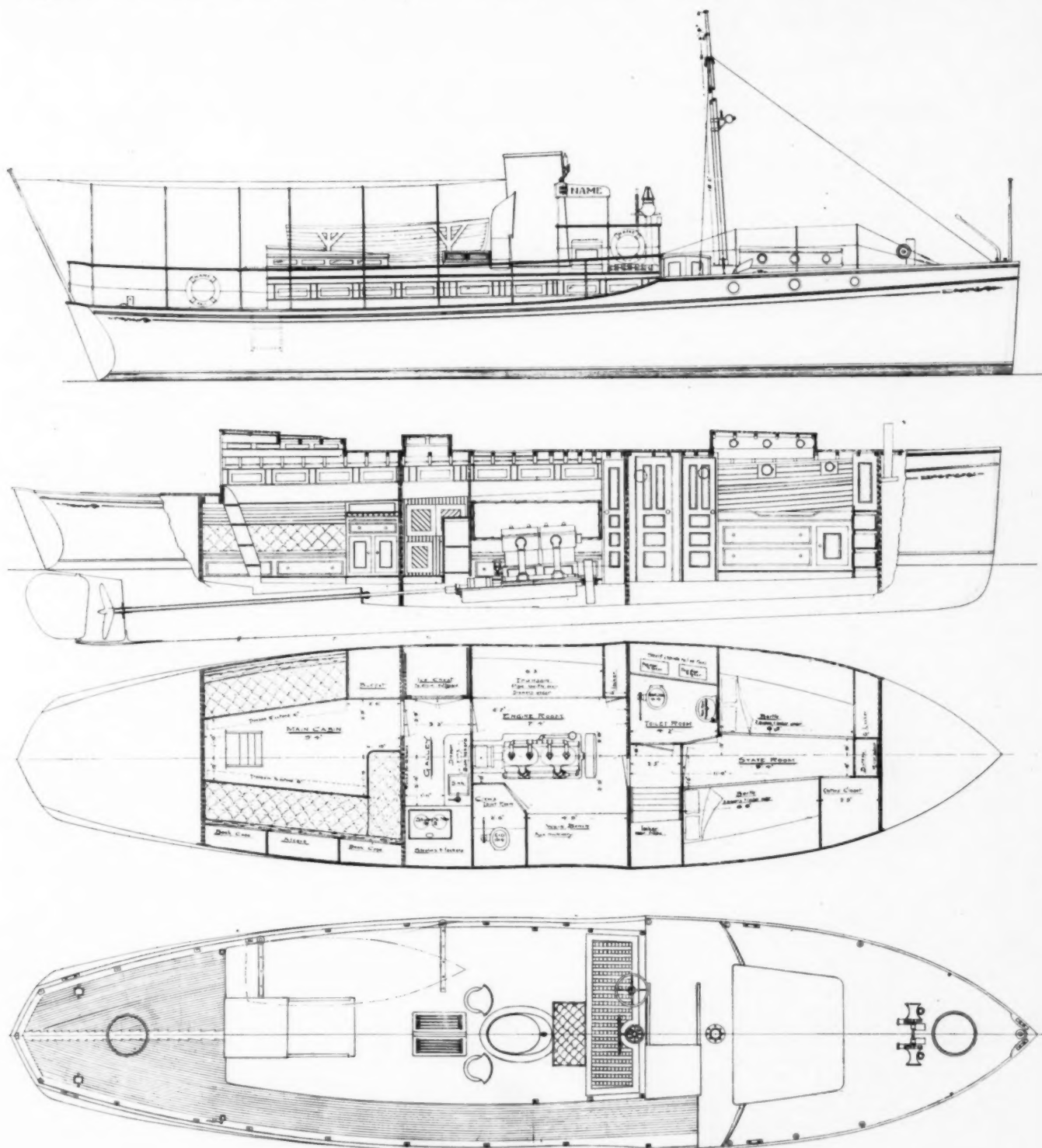
MARINE motors are undergoing a rapid change in their bore and stroke ratios. The general tendency is toward increasing the length of stroke, in relation to bore, and bringing the piston speed to a higher standard. Piston speeds are now employed which a few years ago would have been considered excessive, if not impossible. A prominent speed boat is equipped with reliable engines which turn normally 1,100 revolutions per minute. With a stroke of nine inches the piston speed is 1,650 feet per minute, which today is not excessive. Of course, there are freaks found in all types of motor construction. Three years ago a French speed boat was powered with a single-cylinder motor, having a bore and stroke of 3 15/16" x 9 7/8" respectively. When running 1,875 revolutions the piston speed was 3,065 feet per minute. This motor is said to develop 30 brake horsepower. Gregorie X appeared at last year's Monaco meeting, equipped with a 90 horsepower engine having cylinders 3 1/4" x 12". When developing its 90 horsepower at 1,800 r.p.m. the piston speed was 3,600 feet per minute. These machines were designed to meet certain restrictions and even today their piston speed is excessive.

A few designers cling to their short stroke "snappy" motors and we still find manufacturers of the old "square" (equal bore and stroke) motors. It was a common occurrence to find engines with a greater bore than stroke, but these are now comparatively few and their extravagant use of fuel has put them among the back numbers.

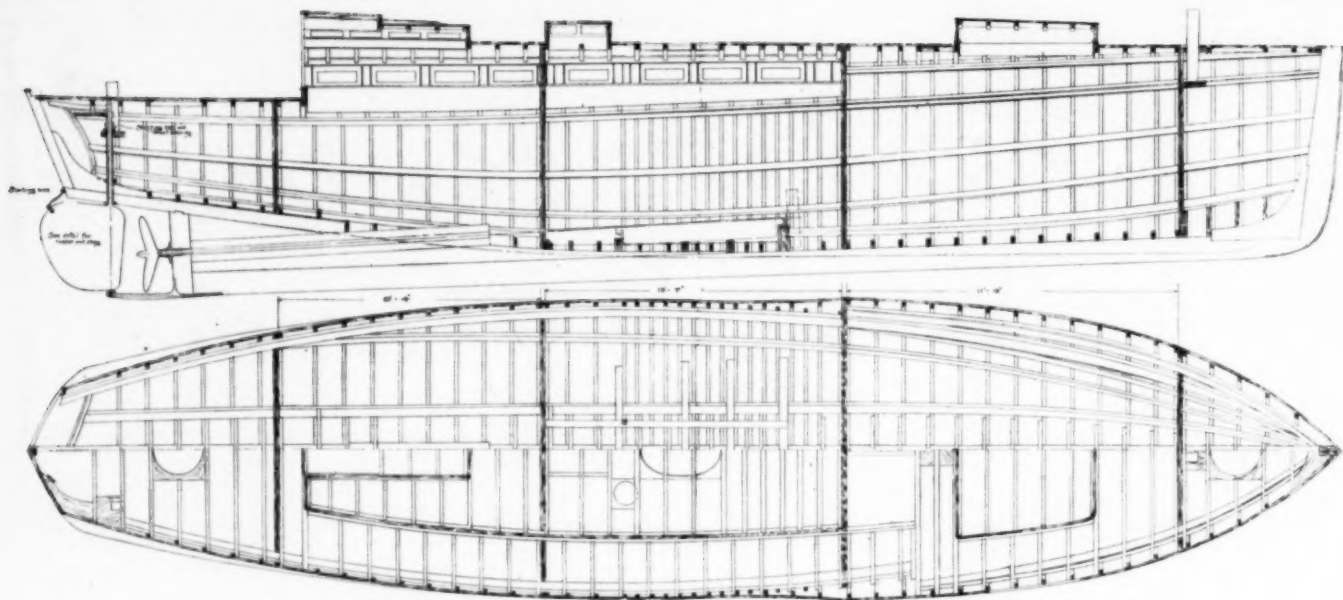
Perhaps the greatest advantage of the long stroke motor, over the short stroke type, is its increased fuel economy, a point not to be overlooked. Other marked advantages favoring the longer stroke are less weight for a given power, longer life, and smoother running with less noise.

The heat units derived from the combustion

Up-to-Date Practice in Motor Boat Design



The 47-footer by Bowes & Mower which is described upon the following page.



Construction plans of the Bowes & Mower raised deck cruiser described below.

A Forty-Seven Foot Cruiser.

THE firm of Bowes & Mower, the Philadelphia naval architects, have made a specialty of raised deck cruisers of the Ilys type, which was originated by them and which has now become a distinctive type of power cruiser. These boats are exceptionally fine sea boats and the form of hull has been so worked out that they are very easily driven with small power, and are correspondingly fast where larger power is installed.

The accompanying design shows a 47-footer, which is now being built for use on the Great Lakes next season, and, while her owner will use her primarily for cruising, it is probable that she will be entered in all the long-distance races to which she is eligible.

The most notable feature of the boat is her arrangement below deck as all the available space is utilized to the best possible advantage. The important things accomplished by the general plan arrangement are: First, engine in the middle of the boat, for good performance in a seaway; second, galley adjoining main cabin so that food can be properly served; third, owner's stateroom, with adjoining toilet room, separated from the main cabin and accessible either through engine room or by a separate companionway from the deck.

The main cabin has a companionway to the after deck and is over nine feet in length,

with wide transoms on either side. The starboard side has built-in alcoves and book-cases, while on the port side the transom is set back against the side of the boat. Both transoms extend to make comfortable berths. The raised companionway hatch, which is a new feature of the recent Bowes & Mower boats, adds both light and a sense of roominess to the main cabin.

The galley is separated from the main cabin by a double watertight bulkhead, made of two thicknesses of diagonally laid sheathing with heavy asbestos felt between, so that it is both fireproof and soundproof. The door is heavily framed and closes on gaskets so that it is practically watertight when closed. With this arrangement there is absolutely no noise or vibration of the engine felt in the main cabin when the boat is under way.

The galley occupies the full width of the boat and a space of over three feet fore and aft. A Shipmate range is set on the starboard side with the stovepipe carried up into the stack over the engine room. A large ice-box is on the port side with sink and dresser in the forward bulkhead.

The engine is a four-cylinder 25 h.p. Standard which will drive the boat at a speed of close to twelve miles per hour. The crew's toilet and a work-bench are located on the starboard side of the engine room and on the

port side is a transom seat with tool lockers under it and over it a folding pipe berth for the engineer.

The owner's stateroom is forward and is over nine feet long with two wide berths and at the forward end is a bureau with clothes lockers on either side. Under each berth are two large drawers and a cupboard so that there is an unusual amount of storage space for clothing, etc.

The arrangement of the stateroom and toilet room will appeal, especially on account of the complete privacy possible where the stateroom is to be used as a ladies' cabin.

Another very good feature is that in bad weather the forward companionway can be used and wet oilskins taken off and left in the toilet room so that the stateroom and after cabin can be kept perfectly dry. The boat steers from a bridge just forward of her funnel and the engine controls are carried to the bridge so that the boat can be handled by one man. She has a mast forward on which sail can be carried to steady the boat or to work her into port in the event of a complete breakdown of the machinery.

In her outboard appearance the boat is well proportioned with a good sheer and well balanced upper works. She will be a notable addition to the power boats on the Great Lakes.

A 45-Foot Raised Deck Cruiser.

THIS attractive 45-foot raised deck cruiser, designed by Southmayd Hatch, a naval architect of New York City, for a prominent member of the National Yacht Club, embodies many new and distinctive features and is an excellent example of the present day seaworthy type of motor boat.

The profile shows a graceful, sweeping sheer-line with slightly curving bow and rakish stern. The deck, without encroaching on the headroom below, is extremely large and comfortable. The bridge deck, located just forward of amidships, gives the steerman an unobstructed view in all directions, and a positive control of the engine from the wheel in addition to that in the engine room. Direct access to the engine room from deck is had by means of a flush hatch on the forward deck.

The entire deck is laid yacht style, that is,

the planking follows the line of the sheer-strake and is finished bright, as is all joiner work. The cabin is built up of panelled mahogany with quartered oak trim. All deck fittings, companion slides, etc., are of mahogany.

The construction throughout is heavy, as the boat will be used considerably for off-shore work. The keel, keelson, garboard strake, plank-sheer and sheer-strake, are of the best selected oak, and where bending is necessary all wood is steamed. The planking is long-leaf yellow pine. There is also a plentiful supply of hackmatack knees distributed throughout to add to the strength of the hull.

The general arrangement consists of a water-tight bulkhead fitted forward forming a chain locker, aft of which is located the engine room with two pipe berths for the crew.

Aft of the engine room, under the bridge deck on the starboard side, is the toilet and lavatory, opposite which is the galley fitted with a large ice-box, dish racks, stove, etc.

Aft of the lavatory and galley is the cabin, sleeping four people on separate berths, with plenty of light and locker room, and with a companion leading to the bridge deck. Owing to the deck cutting off the headroom of half of the transoms, an ingenious method was resorted to to obtain sufficient room for an upper and lower berth. The back cushion is made up on a pipe frame, pivots at a point just under the deck, swings out and up forming the upper berth, extending beyond the lower one a distance equal to that of the width of the deck, as will be seen by referring to the section plan of the cabin. In the day time the space in the back of this cushion is advantageously used for stowing the blankets.

pillows, etc., thereby keeping the lockers clear for clothing. The stateroom is also arranged in this way.

Two gasoline tanks of capacity to give a cruising radius of 400 miles are installed under the after deck and are set in drip-pans draining overboard, thus eliminating the danger of gasoline in the bilge. The water tanks are placed under the cabin floor.

All interior upholstery is green plush, which makes a very pleasing combination with mahogany. The toilet floor is tiled and the woodwork white enameled. The boat is lighted throughout with electricity supplied by a dynamo and storage battery.

With the motor placed well forward and

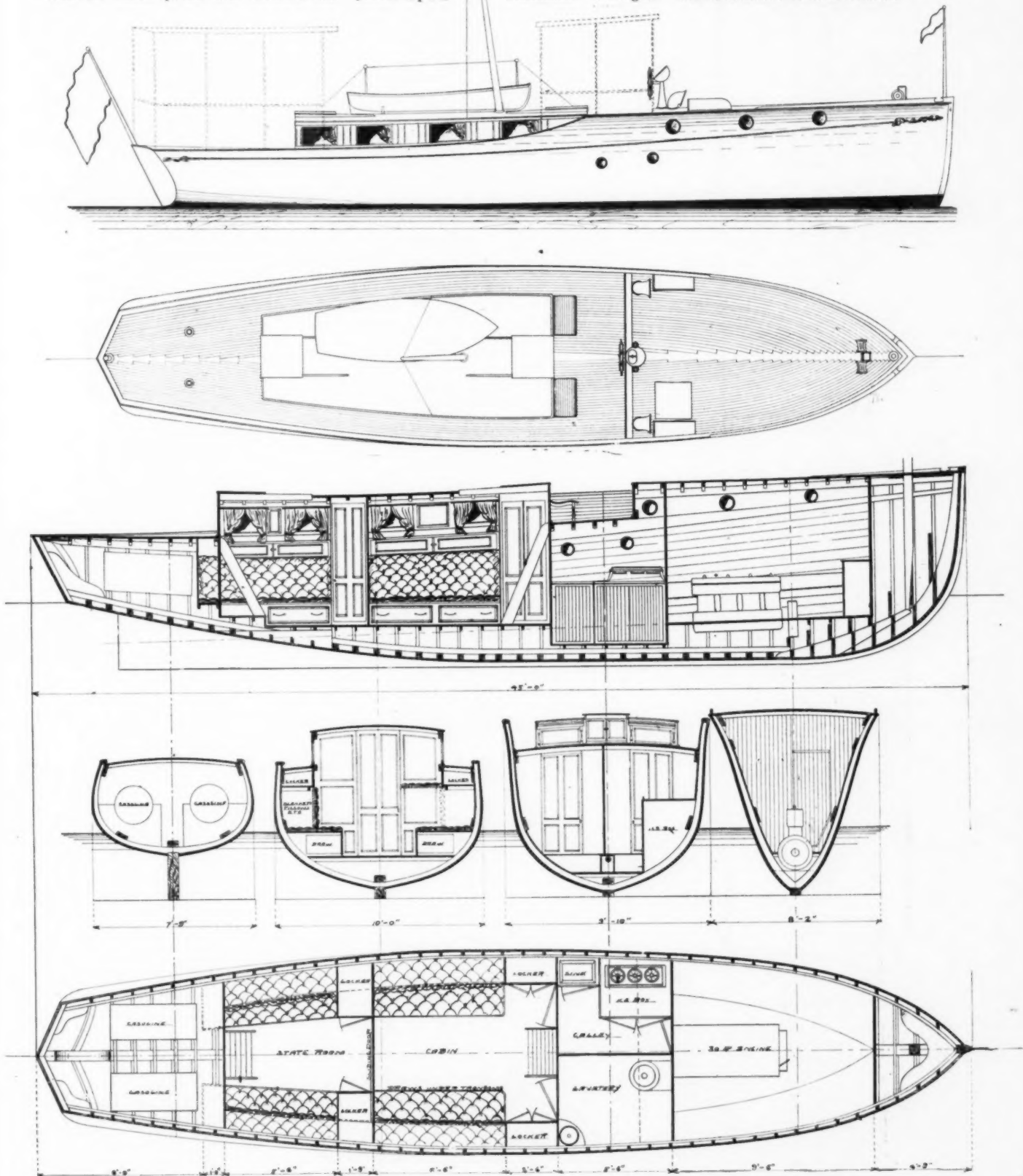
the gasoline tanks aft, a good balance is obtained, and the whole midship portion of the vessel is left clear. A hatch opens from the engine room to the deck, and another hatch opens from the after stateroom to the deck so that when the boat is used to accommodate a large party it is not necessary to pass through the main cabin to reach the after part of the vessel from the forward stateroom.

The trunk cabin arrangement of the main cabin gives an abundance of light with windows, and both the the bridge deck allow chairs. Both are coverable awning sup-stanchions. A signal

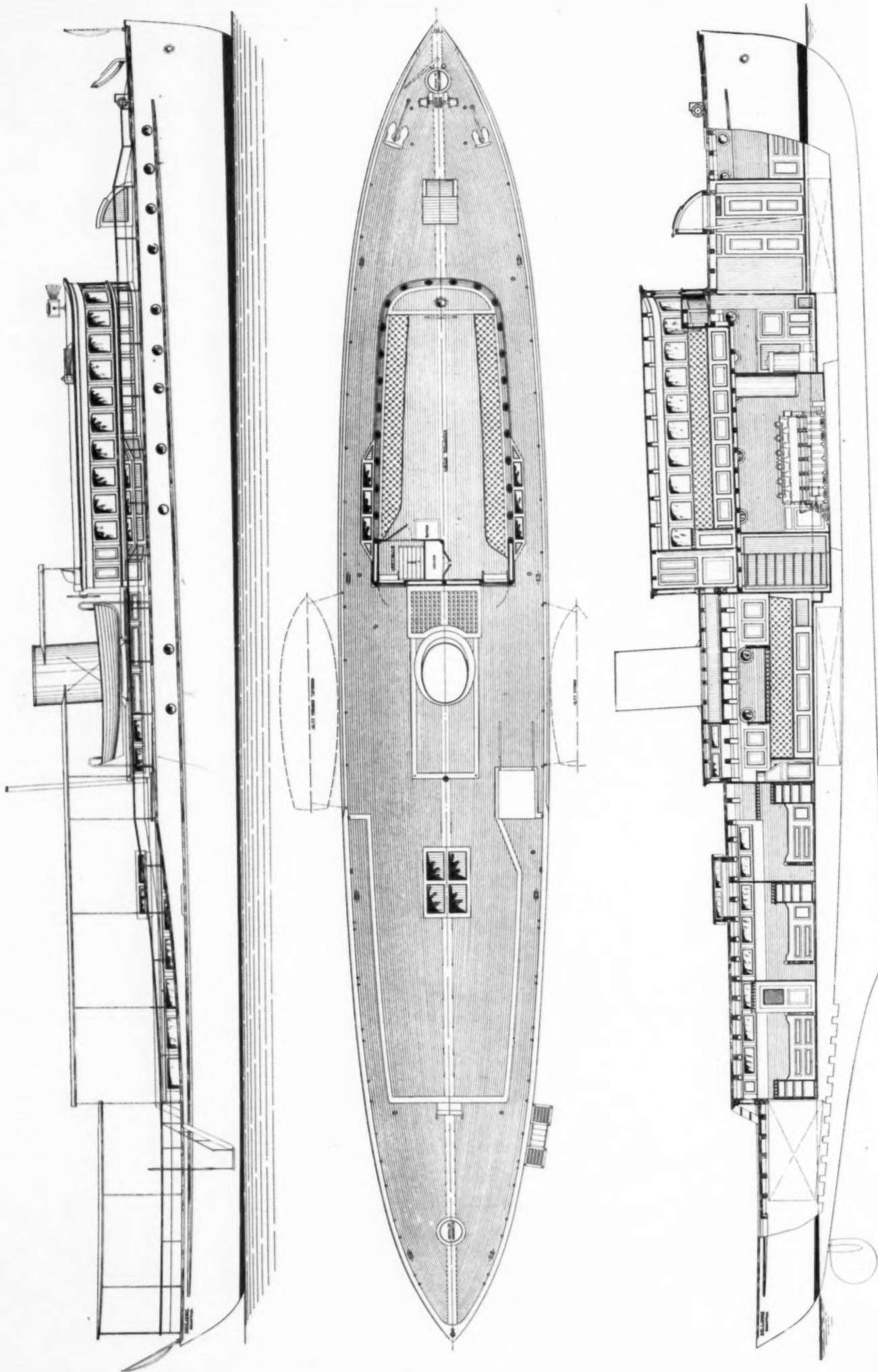
mast is stepped about amidships and is given a considerable rake to add to the general clean lines of the craft.

A dinghy is carried above the trunk cabin where it is readily accessible, yet does not occupy deck space that could be otherwise used to advantage. Three port lights upon a side ventilate the engine room, in addition to a cowl ventilator upon the deck just forward of the wheel.

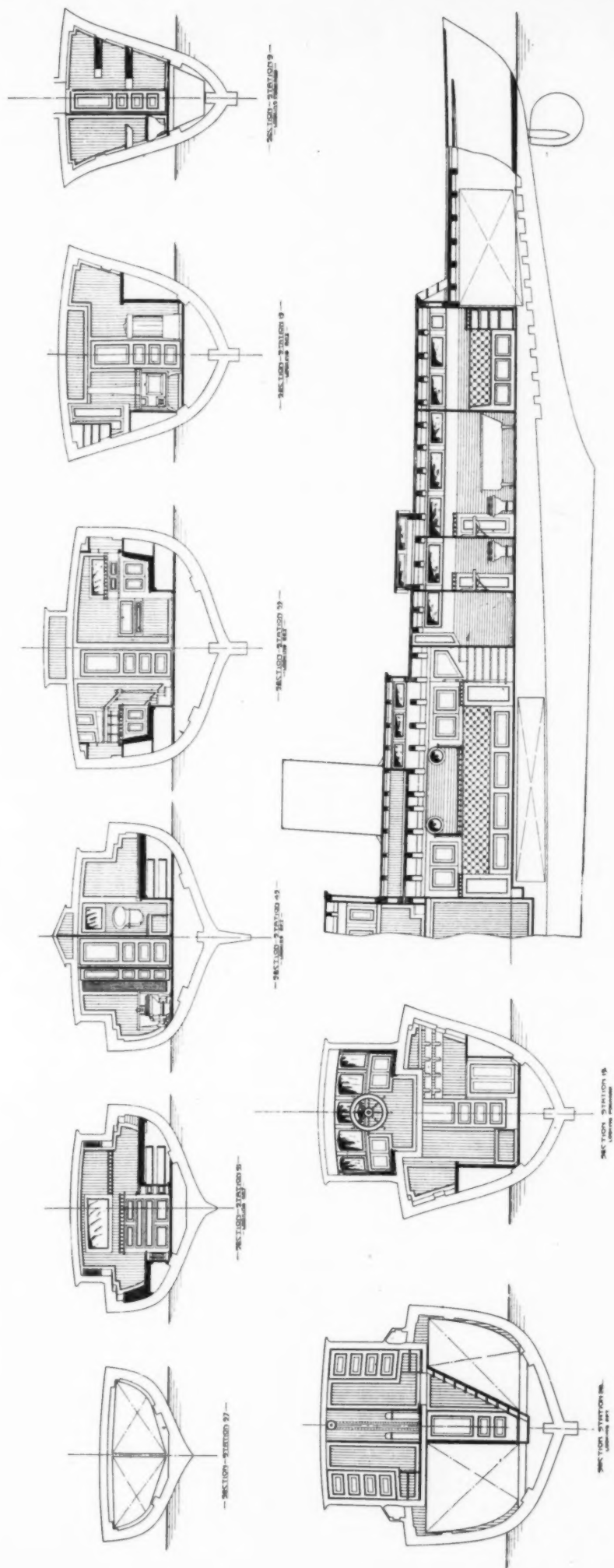
Powered with a 30 h.p. heavy-duty Standard engine, the boat will develop 10 miles per hour, and will prove herself a very comfortable craft in a heavy sea, owing to the ample beam and good deadrise given the underbody with a considerable flare forward.



A 45-foot raised deck cruiser by Southmayd Hatch, embodying a number of distinctive features.



The fastest motor cruiser on the Pacific Coast. Two 125-h.p. six-cylinder motors will drive her about 17 m. p. h.



Sections and arrangement plan of the 100-foot cruiser described upon the following page. The space below decks is exceptionally comfortable and well arranged.

A Seagoing Fifty-five Footer.

IN the plan upon the preceding page is shown a husky seagoing cruiser designed by Wm. J. Deed, Jr., naval architect, of Boston, Mass., for a prominent Western yachtsman who plans to use the boat on the New England Coast. She is 55 feet over all, 11 feet 8 inches beam and 4 feet draught, the liberal dimensions allowing of very comfortable accommodations. No attempt is made to quarter a large party, but comfortable accommodations are provided for a few. The freeboard is high, though not excessive, and with the draught of 4 feet allows of 6 feet 6 inches clear headroom being obtained.

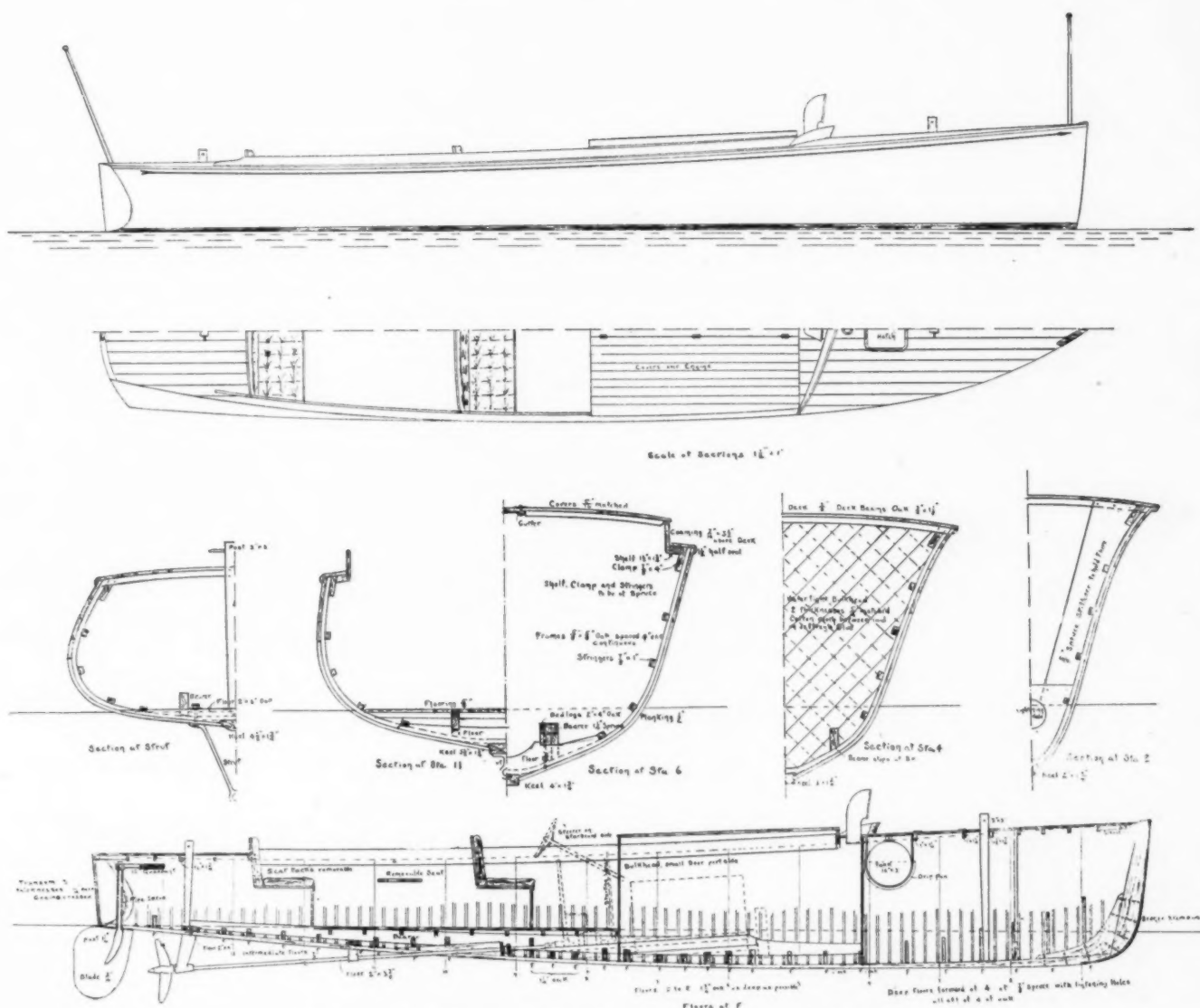
A 40 h.p. Speedway motor will drive the boat at 10 miles per hour and the fuel supply of 500 gallons is sufficient for a long cruise at fair speed.

In the layout much room is given to the vital elements of the design, the motor, galley, dining and sleeping arrangements, both for owner and crew. The motor room offers very good opportunity for giving the motor a chance to do its work, and keep it in repair, there being plenty of room for a proper installation, and a work-bench for repair and upkeep. There is 5 feet 4 inches headroom here under the bridge.

In the galley is a 6-hole Shipmate stove with which the cook can actually cook for a cruise, and hot-water heating is obtained also. A 1,000-pound refrigerator adds to the attractions of this well-appointed galley.

The owner's quarters aft are very nicely fitted up, the finish being in white and mahogany. A bath-tub of good size is in the bathroom on the port side and the room is convenient to all parts of the vessel.

This boat is a larger development of Octa-lee V, built this season from this designer's drawings, which is shown in another section of this publication.



The designs of Norman L. Skene's 30-foot runabout described below.

A 30-Foot Runabout.

ABOVE are shown the designs of a 30-foot runabout by Norman L. Skene, of Bedford, Mass. Several boats have been built from this model and they have proved very successful, owing to the exceptionally clean lines and seaworthy qualities of the craft.

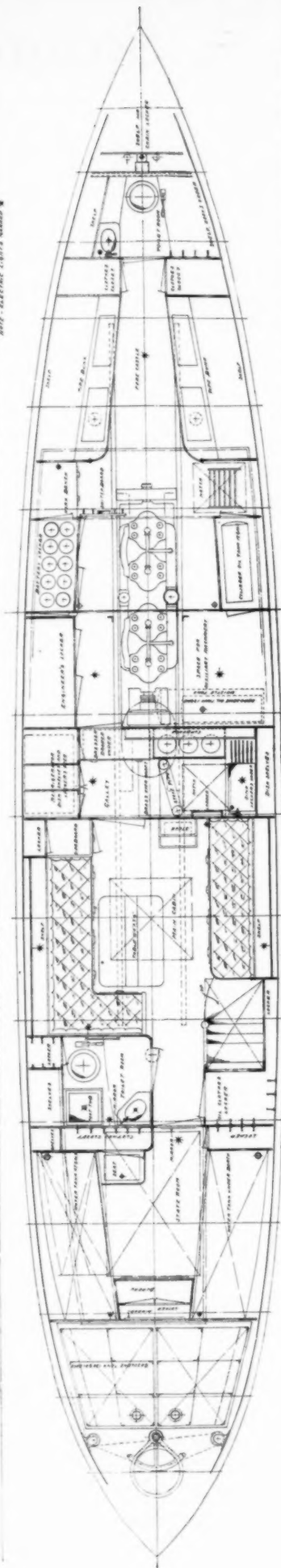
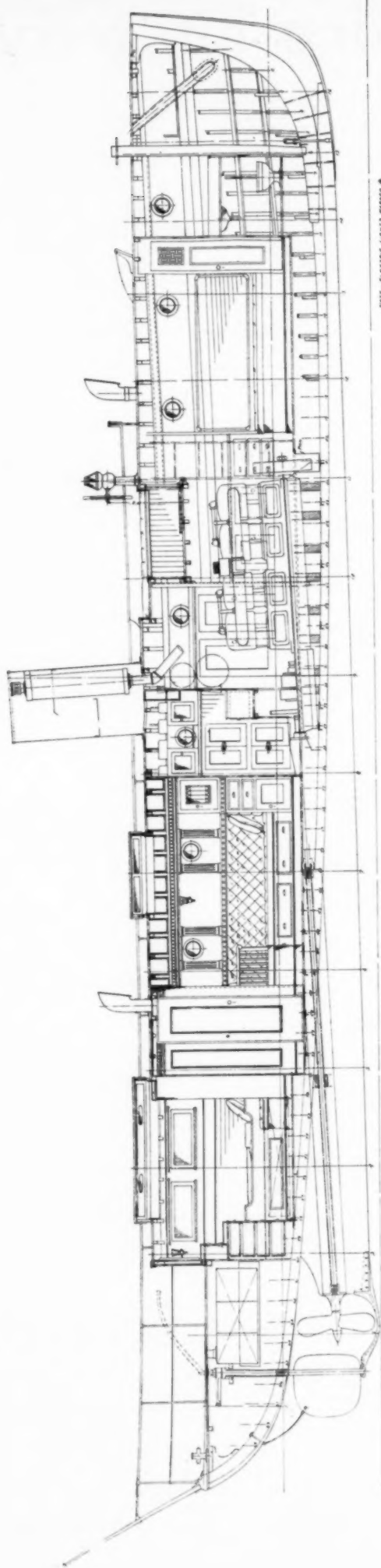
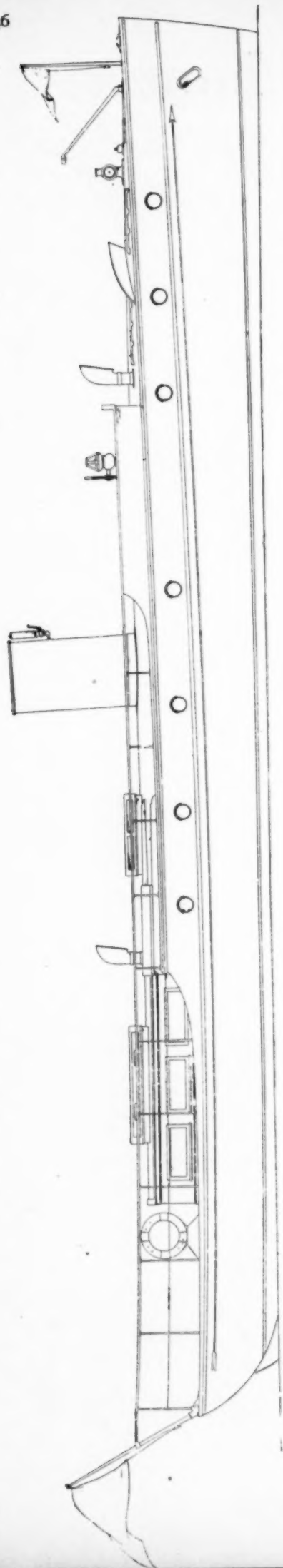
The beam is 5 feet 6 inches, and the popular V-type of transom stern is used. The motor is located forward of a bulkhead, but is

far enough astern to bring the center of gravity in the proper place so the boat will not dip at the bow. Automobile control is used and there is a small door through the forward bulkhead at the port side, so that the motor may be reached without removing the hinged doors in the deck.

Cross seats are used, the steersman's seat and the stern seat having removable backs. A cross seat is placed between these but this is

removable and the space may be used for wicker chairs if desired. The steering wheel is placed on the starboard side and the clutch and reverse gear are placed within easy reach.

A hatch is located in the turtle deck forward of the motor and this space may be used for stowage. A cowl ventilator cools the motor compartment and the gasoline tank is slung by straps from the deck just forward of this underneath.



This 60-footer by Swasey, Raymond & Page is built similar to their standard 50-footers and is to be used along the New England coast. She is built upon clean lines and should show a fair speed.

A Comfortable Sixty-Footer.

THE designs upon page 46 show an interesting construction adapted by Swasey, Raymond & Page, of Boston, from their standard type of 50-footer. This craft is being built at Graves' shipyard at Marblehead, Mass., for Mr. Lawrence F. Percival, and will be used along the New England Coast after her launching early in the spring.

The yacht is 60 feet over all, with a water-line length of 54 feet and an extreme beam of 10 feet 6 inches. Her draft is 3 feet 9 inches. The lines of the craft are very pleasing, as she is a combination of the raised deck and trunk cabin construction. Deck space is provided at the stern, from which a companionway leads down into the main cabin.

The crew's quarters are forward and consist of two pipe berths in the forecabin. Opening from the forecabin forward is a toilet room for the use of the crew, and between these is space for a clothes closet upon either side. Aft of the forecabin is the motor room, with space for a work-bench and a switch-board just forward of it.

The motor equipment consists of a 100 h.p. 8-cylinder Sterling engine, which should give her a good speed. Upon the port side of the motor room is an engineer's locker and upon the starboard side space is provided for auxiliary machinery and the lighting plant.

Aft of the motor compartment is a thwart-ship galley equipped with a stove and a refrigerator. A stovepipe from this compart-

ment extends into the stack, which is placed just over it.

Aft of this is the main cabin, which is a very comfortable room, equipped with leather upholstered seats upon two sides and a table in the center. This room is used as a dining-room and is convenient to the galley. A clothes locker is aft of this upon the starboard side, and across a passage from this is a toilet room.

The owner's stateroom is in the after part of the vessel in the trunk cabin section and has two transom berths under which are the fresh water tanks. A locker with mirror and a bureau are at the after end of this stateroom, and lockers, shelves and a clothes closet are at the forward end.

A Thirty-six Foot Cruiser.

THE accompany drawings are of a 36-foot cruiser especially designed for a long-distance racer, but with accommodations for comfortable cruising. The designers and builders, the Atkin-Wheeler Co., of Huntington Harbor, Long Island, have worked out a rule-beater in this craft, the width on deck being 8 feet 4 inches and the water-line 7 feet 4 inches. The freeboard at the bow is 5 feet, at the stern 2 feet 8 inches. The sections forward show considerable flare, and aft the water-line is narrow.

There are two motors of considerable power, with a small bore and a long stroke, each of the single-cylinder variety, medium speed and simple. Reliability, low rating and moderate speed should bring success in these races. This craft will rate under 35 (A. P. B. A. rating) and has a guaranteed speed of eleven miles an hour, which speed the builders hope to exceed.

Entering the companion doors, on which there is no slide, one finds two motors, a work-bench, lockers, oil cans, tools, etc.—a place for everything. Forward of these on the starboard side is the toilet room, and opposite, the galley, fitted with an ice-chest, sink, stores, etc., and forward a fine, comfortable cabin. The space under the aft deck is for storage of supplies, and all the odds and ends that

collect aboard during a season of use. There is room, too, for an able dinghy on the deck.

A skylight hatch opening in the deck above the cabin affords light and ventilation, and one cowl ventilator upon either side near the skylight furnishes additional light and air.

The steersman is located upon the port side of the craft aft of the raised deck, and stands in the cockpit from which he has an unobstructed view upon all sides of the craft. The stern is a square-shaped transom and will carry along with it but little swell when the boat is running at full speed.

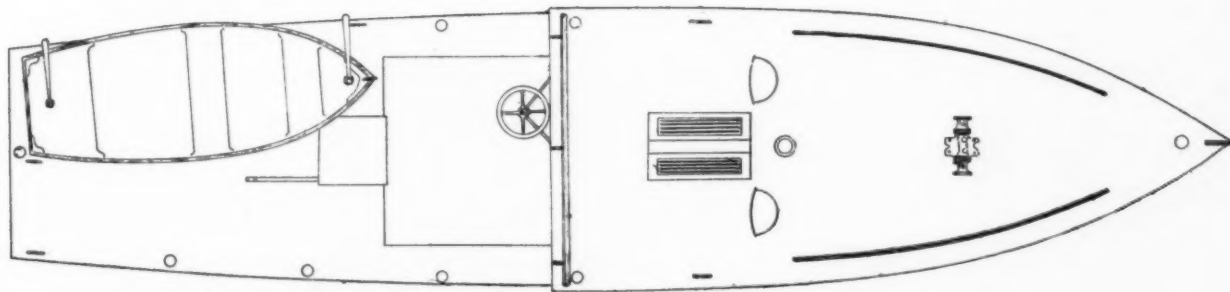
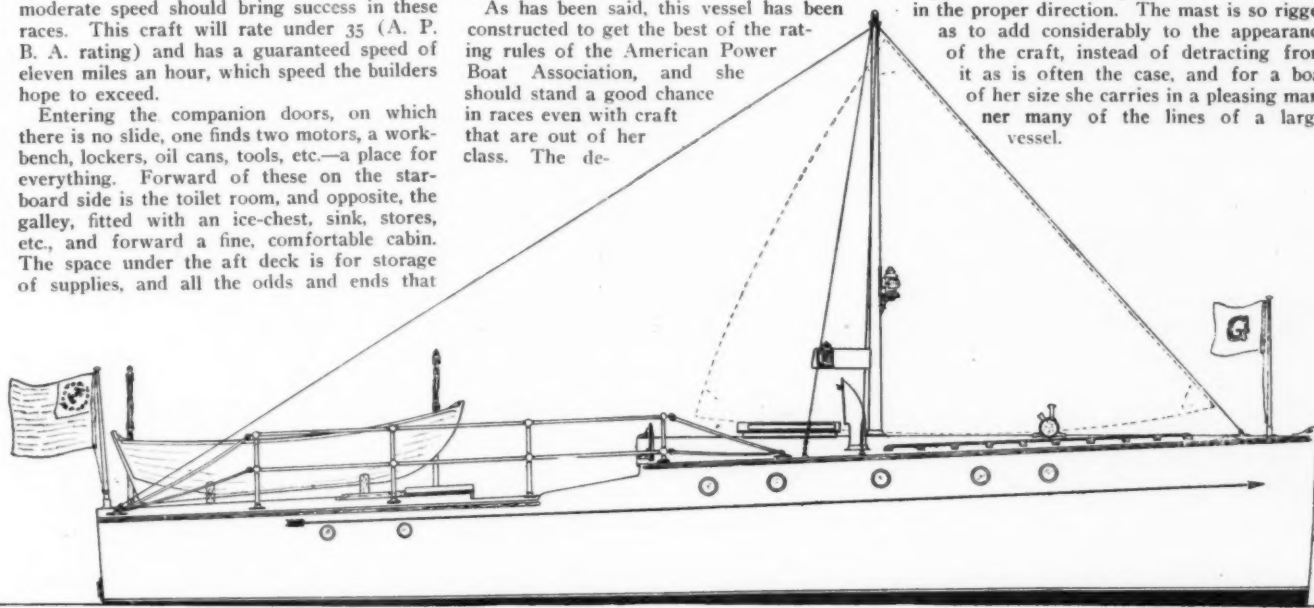
Fitted with a mast, well stayed, and a stout hand-rail around aft, the boat gives a pleasing and shipshape appearance.

As has been said, this vessel has been constructed to get the best of the rating rules of the American Power Boat Association, and she should stand a good chance in races even with craft that are out of her class. The de-

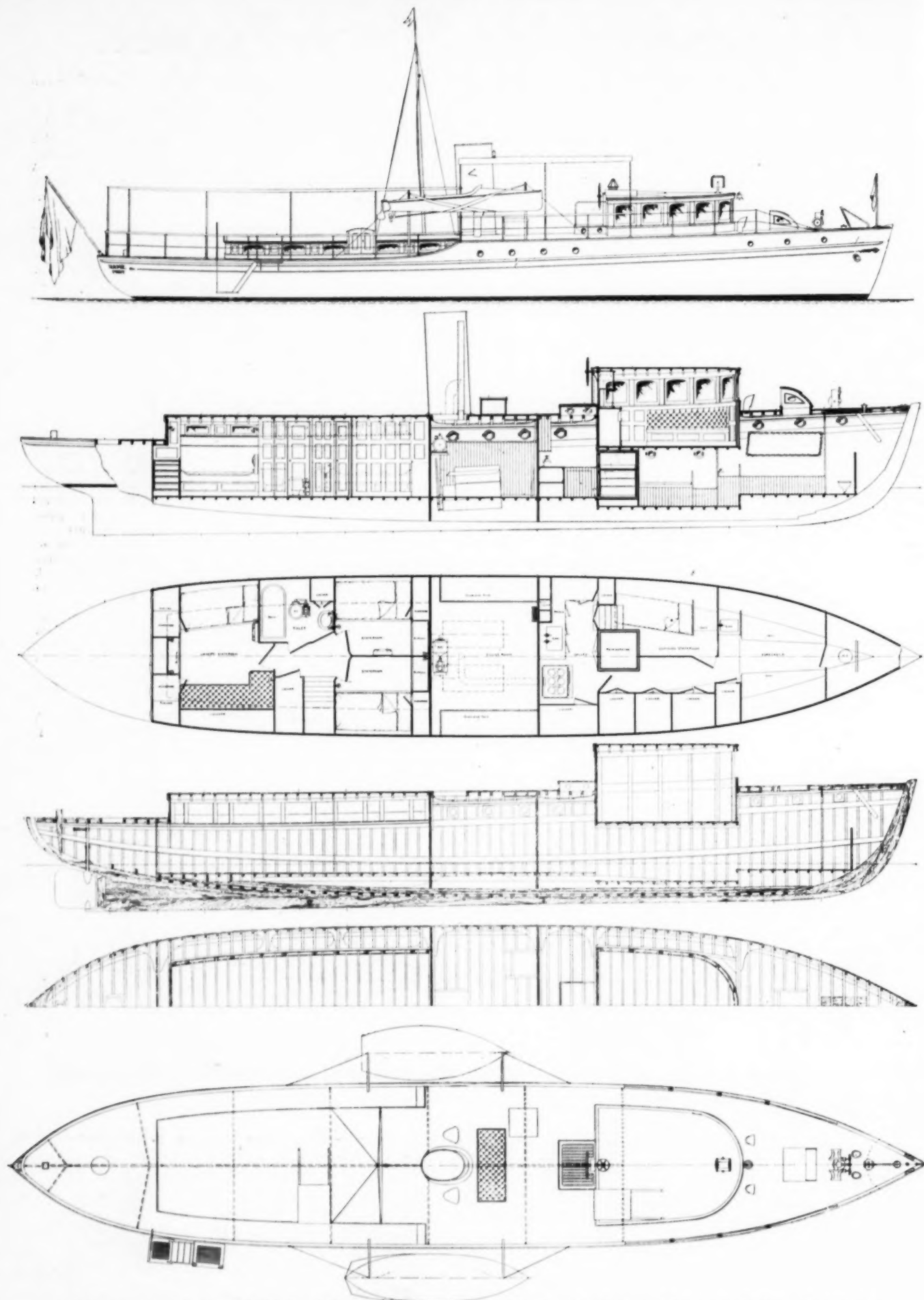
signers do not state her draft, and her water-line is so narrowed toward the stern that the midship section is unusually broad in comparison. There are no unnecessary fittings or equipment upon the boat, but she has sufficient deck space to carry an extra supply of gasoline when entered in a long cruising race.

The cabin contains comfortable sleeping accommodations, and since the vessel is equipped with a toilet and galley, the crew can be made very comfortable upon as long a race as such a small craft is able to enter.

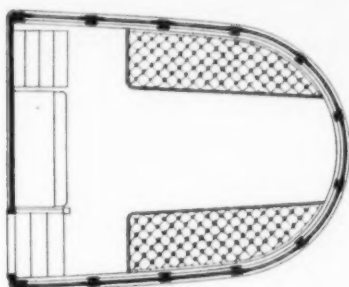
Auxiliary sails may be carried from the signal mast, sufficient to keep her headed to the wind should an accident occur to her machinery, or to assist her speed when the wind is in the proper direction. The mast is so rigged as to add considerably to the appearance of the craft, instead of detracting from it as is often the case, and for a boat of her size she carries in a pleasing manner many of the lines of a larger vessel.



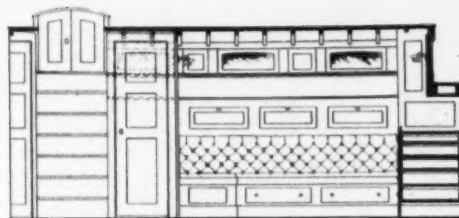
A 36-foot cruiser that is built especially for racing. She has good lines and a low rating.



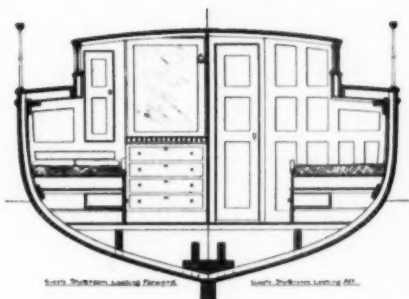
Achelous, a new boat by F. S. Nock, which is described elsewhere. She is 75 feet long and has a speed of 11 miles per hour.



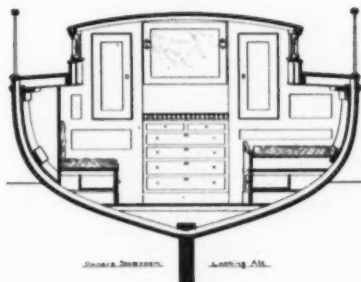
Plan of Motor Boat.



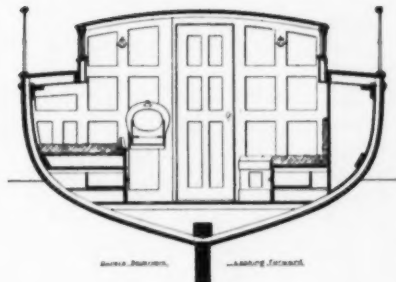
Gasoline and Storage Tanks of Motor Boat.



Section Plan of Motor Boat.



Section Plan of Motor Boat.



Section Plan of Motor Boat.

Section plans of Achelous, a complete description of which appears upon page 8 in this issue.

A 65-Foot Fast Cruiser.

AN interesting boat from the office of Carlton Wilby, of Detroit, is shown below. This boat will be built for a well-known Detroit yachtsman for use next season, plans being now in preparation.

The profile shows an extremely clean-lined craft with raised deck forward and trunk cabin extending well aft. Forward on the raised deck a low deck house is shown with a steering bridge just aft protected by it. A water-tight cockpit, sunk well below the level of deck, is shown at the extreme after end, this feature being adopted in preference to a flush deck, partly because of the additional security for the owner's young children, and partly for the sake of appearance.

The cabin plan shows good accommodation for a boat of this type. The engines are located slightly aft of amidships with the fuel tank athwartships against the after engine room bulkhead. This makes an ideal location for these heavy weights and will do much to insure good seaworthy qualities. Two pipe

berths for the crew are provided in the engine room, and forward is shown the crew's toilet room. Steel watertight bulkheads separate the engine room from the rest of the boat, both forward and aft.

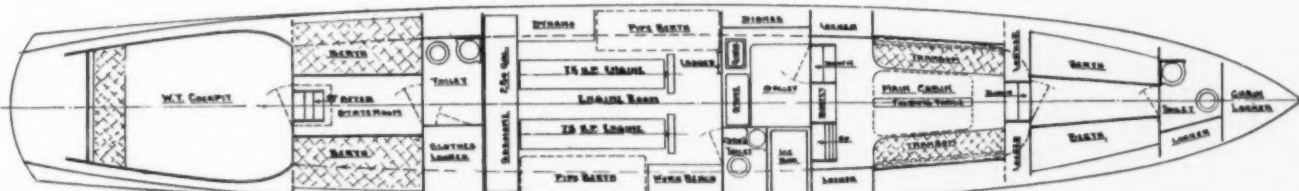
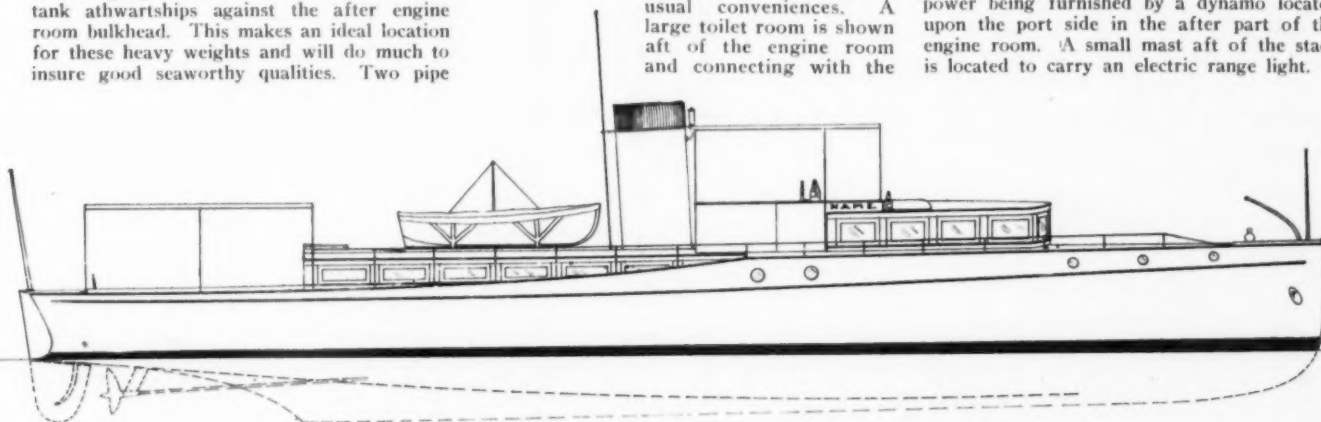
The galley is located immediately forward of the engine room and occupies the full width of the ship and will be furnished with all the latest appliances. The main cabin and dining room is shown just forward of the galley and is fitted with full-length transoms upon each side and a sideboard at the after end. This cabin is raised above the level of the forward deck and will be a very pleasant place to sit during bad weather. A door at the forward end of the main cabin leads to the forward stateroom which has berths for two. Forward of this stateroom is the forward toilet room, with the usual conveniences. A large toilet room is shown aft of the engine room and connecting with the

after cabin, which is fitted with double transom berths upon each side.

The boat will be strongly but lightly built, with cabin and decks finished in mahogany. Two engines of 75-100 h.p. each will be installed, which will give a speed of 18 to 19 miles. The boat is 65 feet in length, with 10-foot beam, and 3 foot, 3-inch draft.

The engine room is ventilated by a stack, which also adds to the appearance of the craft. Aft of the stack, upon the trunk cabin section, a dinghy is carried in an accessible position, which does not occupy useful deck space.

Both the bridge deck and the cockpit are covered by removable awnings upon stanchions, and the cockpit is further protected by the after section of the trunk cabin. The boat is lighted throughout by electricity, the power being furnished by a dynamo located upon the port side in the after part of the engine room. A small mast aft of the stack is located to carry an electric range light.



A feature of Carlton Wilby's design is the watertight cockpit aft. The boat can make 19 m.p.h.

A Trim Sixty-Seven Footer for Florida Waters.

UPON this page are shown the designs of a craft delivered in October by the Matthews Boat Company, of Port Clinton, O., to Mr. W. S. Milne, of Cleveland, Tenn., who will use the boat in Florida during the winter.

The Matthews Company do not build stock models, owing to the large number of individual details that the average buyer wishes incorporated in the construction of his craft, and this boat, as usual, embodies several particular features that render the craft unusually comfortable, especially for the section in which she will be used.

The length over all is 67 feet, 6 inches, and she is equipped with two 25 horsepower motors and a Fay & Bowen electric plant. The finish throughout is similar to Leonor II and Jamaha, both of which

were completed during the past summer by the company.

In general appearance the outboard profile resembles a steam yacht of larger dimensions, as the vessel is equipped with a good-sized stack a trifle aft of amidships, forward of which is a signal mast. The motors are arranged almost amidships, with the gasoline tank on either side of the motor room. This arrangement serves to keep most of the weight in the center, giving the boat a better trim and permitting the use of valuable space ordinarily unavailable for stowing.

A chain well occupies the extreme forward section, and just aft of this is the crew's toilet, opening from the crew's quarters.

The crew's quarters are entered through a companionway from the forward deck and consist of two transom berths and two pipe berths.

Aft of these quarters is the main cabin, furnished with upholstered seats, two alcove spaces and lockers. This cabin is lighted through Pullman windows at the side. Aft of the main cabin and opening into it is the galley, equipped with an ice box, buffet, table, sink and lockers. The motor

room is aft of this, between it and a double stateroom. This stateroom is furnished with two transom berths and a dresser, and opens out upon a passage with

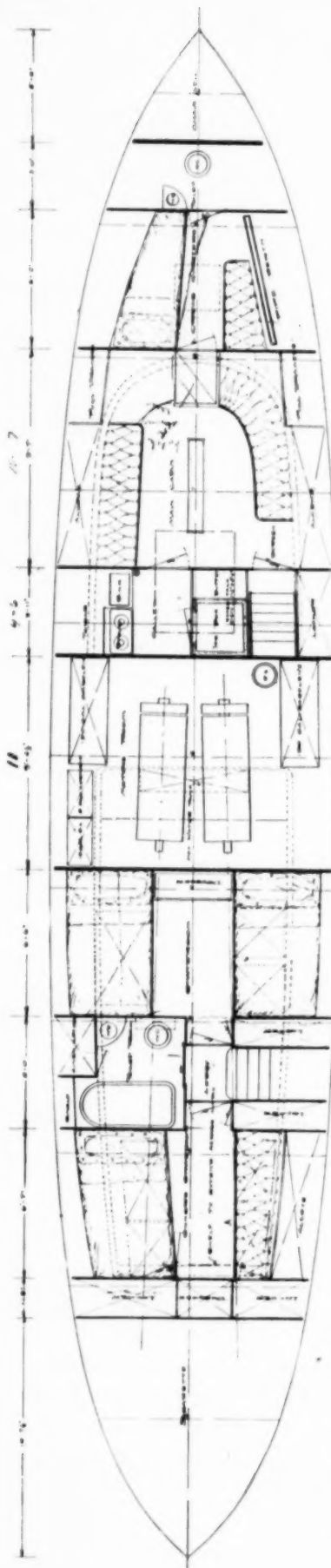
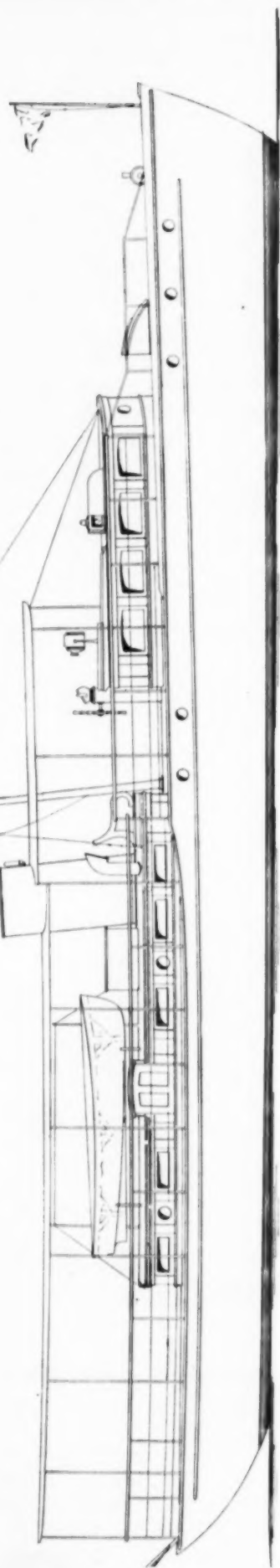
upon a passage with

which the bathroom communicates upon the port side, and a companionway to the deck upon the starboard side.

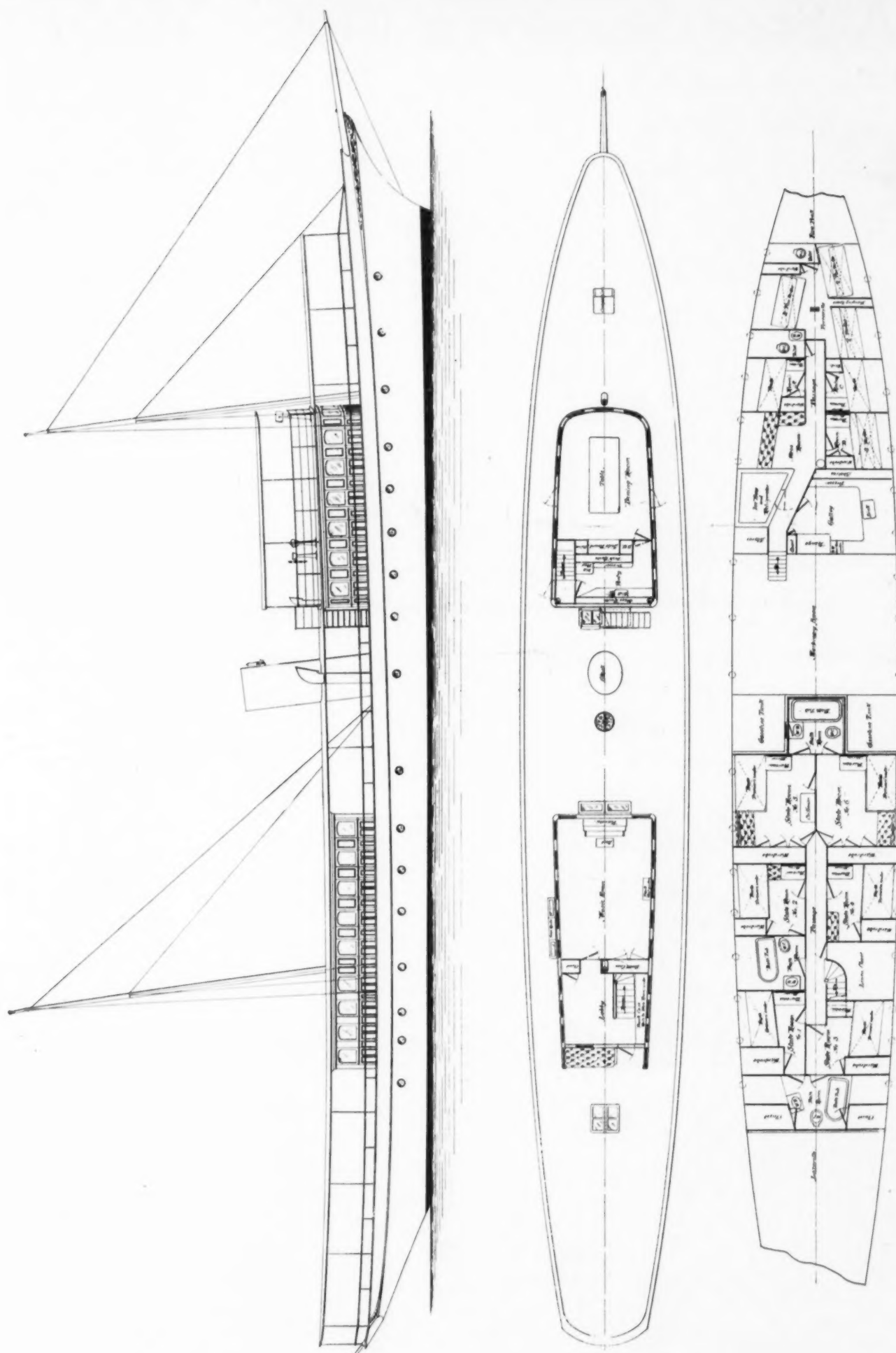
Aft of this lobby or passage is the owner's stateroom with two transom berths, a dresser and an abundance of locker and shelf space.

The deck arrangements give considerable space for comfortable quarters, especially aft, although a seat is provided upon the bridge deck across the forward end of the trunk cabin. A dinghy is carried upon davits above the trunk cabin so that it does not occupy deck space.

Although the power is not large, twin screws drive the craft without vibration and she can maintain a good cruising speed. A further description of this craft will be found upon page 10.



Ocoee, a Matthews craft which was sent to Florida a short time ago, embodies a number of distinctive features. A full-page illustration of this yacht appears upon page 11.



This steel sea-going motor yacht was designed by Gielow & Orr and is equipped with three 100-h.p. motors. A description will be found upon the following page.

A Steel Sea-going Motor Yacht.

UPON the preceding page are shown the tracings of a steel sea-going motor yacht designed by Gielow & Orr, of New York City, for a New York yachtsman. The over-all length of this craft is 145 feet, 9 inches; length of load waterline, 116 feet; beam, 20 feet; and draft, 6 feet, 10 inches.

The hull will be built of mild steel, Siemens-Martin process, and the deck houses, skylights, and wooden deck structures will be of teak. The joiner work below decks will be of white pine panel work, finished in white enamel, and the bureaus, fronts of berths, sofas, lockers, etc., will be of polished mahogany. The plumbing will be of the open type throughout.

As the lines show, the craft will much resemble a steam yacht of the larger type, the entire deck being covered, and both a fore and aft deck house being used. A covered bridge deck occupies the space above the forward deck house, the house being used as a dining room. It is equipped with a table in the center and a pantry at the after end connecting with the galley below.

The after deck house is a music room and contains a piano and a writing desk. Aft of

this room is a lobby containing a closet, book cases, and a flight of stairs communicating with a passage below from which the state-rooms open.

The machinery space separates the vessel into two divisions, the forward and smaller being occupied by the crew's quarters, including a mess room, and the galley. Aft of the machinery compartment is a bathroom in the center, connecting with a stateroom upon either side aft of it. Between the walls of the bathroom and the sides of the vessel are the gasoline tanks.

Each stateroom contains a berth with drawers under, and a bureau, the port stateroom also being equipped with a chiffonier. At the after end of each is a wardrobe.

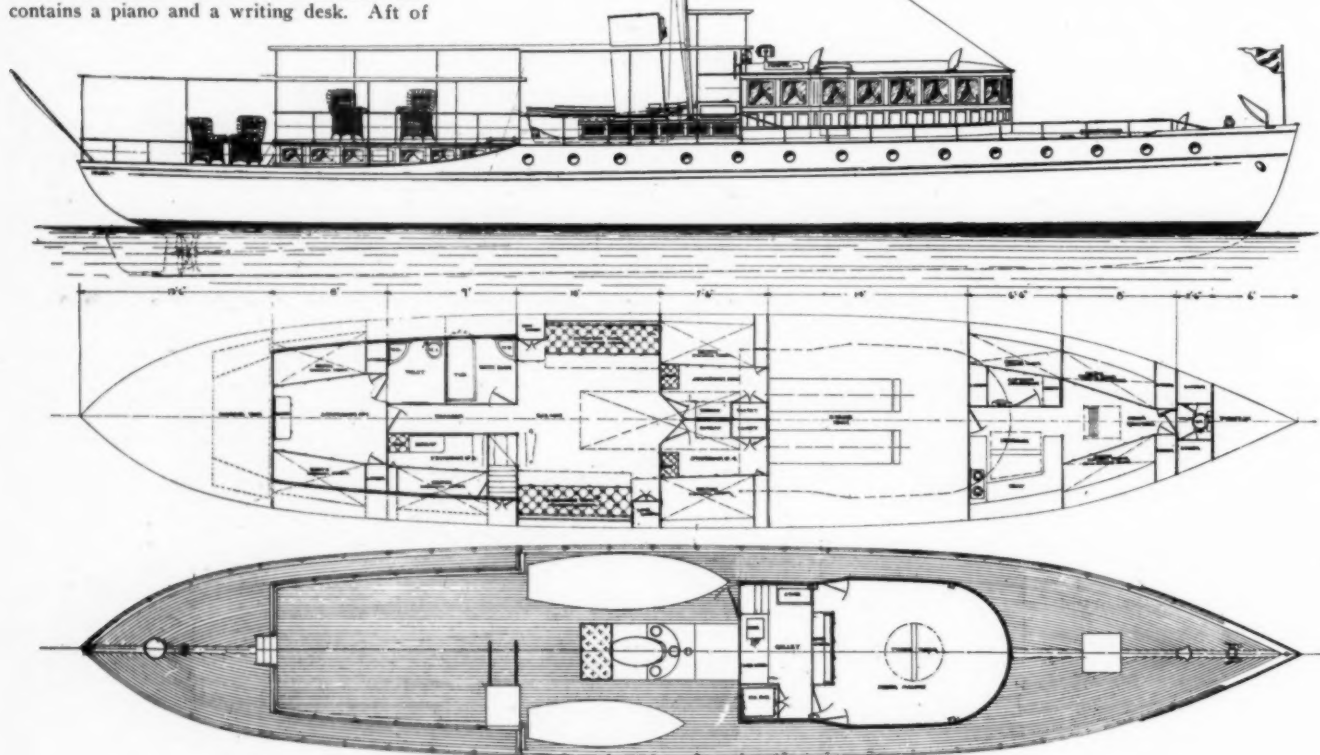
Aft of these rooms upon the starboard bathroom upon the opening into the pas-
which all the state

is a linen closet
side and a
port side
sage with
rooms

connect. The bathroom also connects with the stateroom just forward of it. Two other staterooms, each connecting with a bathroom at the extreme after end, are located upon either side of the vessel. All of these state-rooms are equipped with wide berths, wardrobes and bureaus, with ample closet space. The whole accommodation for the owner and guests includes six large staterooms and three baths, each room with one exception being arranged to connect directly with a bath.

The motor equipment consists of three 100-horsepower Standard motors, with air-starting and reversing gear, an electric generator of four kilowatt output, and a storage battery for use in connection with the lighting system. The gasoline tanks are of seamless galvanized steel, enclosed in watertight bulkheads, and have a capacity of 3,000 gallons.

The speed of the vessel will be 15 m.p.h. at full power, 13.20 m.p.h. at two-thirds power, and 10.50 m.p.h. at one-third power, and her cruising radius will be 1,120, 1,475 and 2,350 miles respectively at these speeds.



An 85-foot yacht built by the New York Yacht, Launch & Engine Co., and described below.

An Eighty-Five Footer.

THE accompanying drawing shows an 85 x 15 x 3½-foot power yacht, planned by the New York Yacht, Launch & Engine Co., of Morris Heights, New York. The design shows a comfortable and seaworthy yacht, having the owner's quarters in the after part and the crew's quarters on the forward part of the boat, with a large and roomy deck house above the engine room. A galley is situated in the after end of the deck house, the deck house being used as the dining saloon.

The yacht is to be equipped with two 4-cylinder 8 x 10-inch 50 h.p. 20th Century motors, and will have a speed of 14 miles per hour.

The crew's quarters are in the forward part of the vessel and consist of upper and lower berths and a captain's stateroom; the mess room is located opposite the captain's state-

room. The engine room is equipped with berths and lockers on each side. A watertight bulkhead is aft of the engine room and separates the owner's quarters from the working part of the boat.

The owner's quarters consist of two staterooms alike in detail, with a large double berth, chiffonier, hanging closet and a seat. Aft of these two staterooms is a saloon with a small buffet on each side. Aft of the saloon is a bathroom and toilet with entrances from the stateroom and from the passage. The after stateroom is a double one and will be equipped with double berths on each side with a bureau between on the after bulkhead.

This boat will be built by the New York Yacht, Launch & Engine Company, her designers, and the interior finish will be white and gold. The cabin and deck house will be mahogany throughout.

The yacht is provided with an unusual amount of deck space, particularly for this type of craft, since even with the large deck house a considerable portion of the raised deck section is available, and in addition to this chairs may be placed upon the trunk cabin section aft.

The bridge deck and the after section is covered by a removable awning and two tenders are carried one on either side of the stack amidships.

The owner's quarters are abundantly lighted through Pullman windows in the sides of the trunk cabin, the remainder of the vessel below deck being lighted through portholes. With a signal mast placed just forward of the stack and the rather low freeboard, the craft has a racy appearance which is very pleasing. The capacity of her gasoline tanks gives her a considerable cruising radius at top speed.

A New Type of Small Cruiser.

BELOW is a design drawn by Morris M. Whitaker, Naval Architect, of New York City, for a man in the New England states who expects to live upon the boat practically all the year round. She will be used mostly upon Long Island Sound, though cruises of considerable extent will doubtless be made, as the craft is constructed with extreme solidity all through, the scantlings being unusually heavy for a boat of her size. Her owner believes in strength, and there is not a weak spot in the vessel.

As the plans show, the boat is of the flush-deck type from stem to stern, and follows the lines of a steamship to a considerable extent, being of practically a new type as applied to the small cruiser. She has deep draft and heavy displacement, and as can be seen from her arrangement plan, she has a maximum amount of accommodation with two large, double staterooms. These rooms extend the full width of the boat and are entirely separated from the main cabin and day part of the craft. Between the staterooms toilet accommodations are provided.

The main saloon is forward of amidships and is furnished with extension transoms on either side and lockers and alcove spaces above. Under the floor of this cabin are the fresh water tanks. A buffet is at the after end of this room and the room communicates forward with a galley which is just aft of the forepeak bulkhead.

The motor and gasoline tanks are amidships, giving a good trim to the craft, and as it is the owner's intention to run without a crew, no crew's toilet has been provided, although arrangements are made so that one can be installed very easily.

The trunk sky quarters is a full head room stateroom. This providing a step height of the toilet to the fore room. The cabin arrangement makes a very satisfactory one and

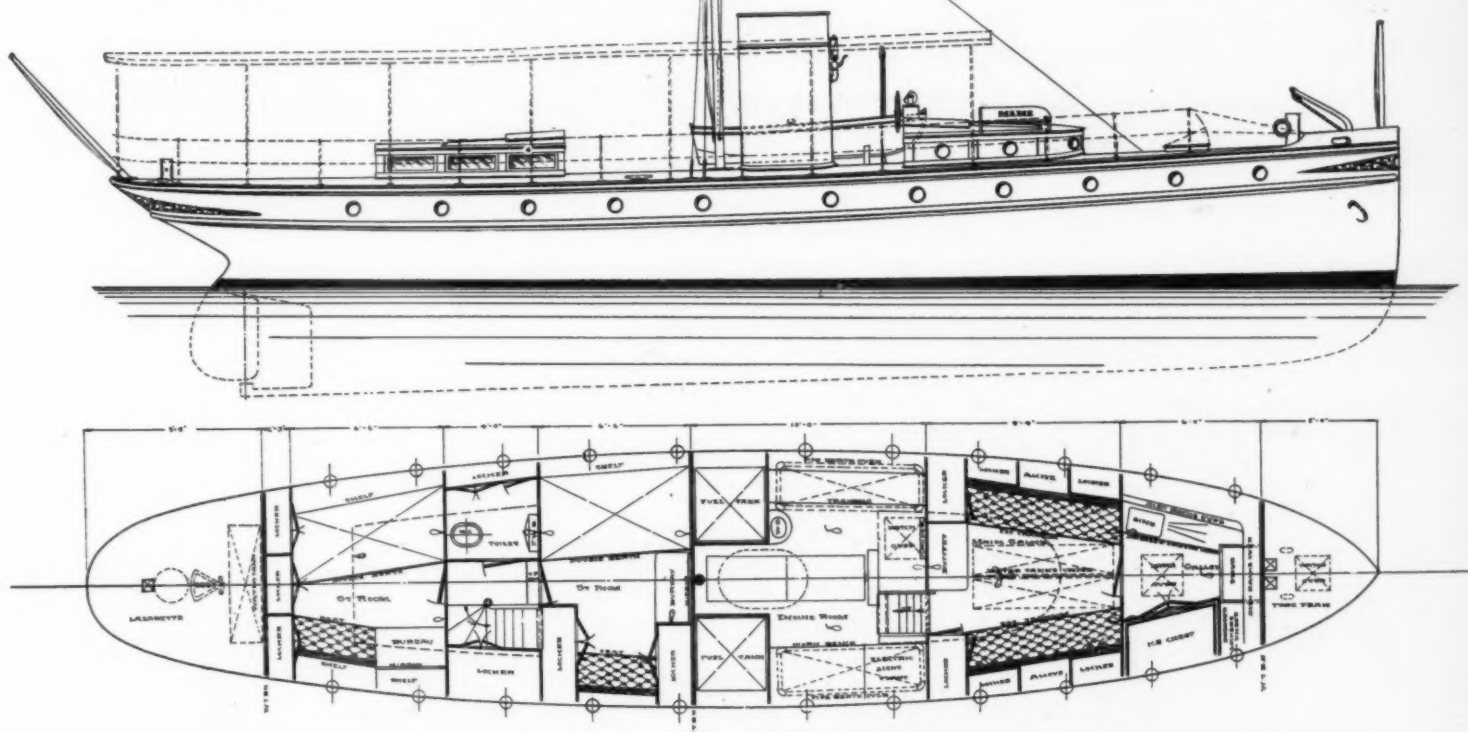
light over the after ranged so as to give under it in the after is accomplished by down from the flooring at the ward state-
double-
ment

provides an unusual amount of room at either end of the vessel.

The exhaust is placed in the stack and the motor controls are brought up to the wheel, which is located just forward of the stack and aft of the forward cabin, so that the craft can be handled by one man.

The hull is to be of oak and yellow pine, the latter being used in the planking. The deck house and trunk skylight upon the after deck will be of mahogany. The interior finish will be of mahogany and white enamel. An awning covers the entire deck, and a signal mast is stepped just aft of the stack.

A feature of this boat is the size and economical arrangement of the motor room. The engine equipment has not yet been decided upon, but the boat will be driven by a single screw. The fuel tanks are located upon either side of the motor, and a work bench is installed upon the starboard side. Next to this is the electric light plant. Pipe berths for the crew when needed are provided upon both sides of the engine room, and a transom in addition is located upon the port side.



A popular design with unusual accommodations, by Morris M. Whitaker. She can be handled without a crew.

Jim Wilder No. 2,—A Motor Tug.

WHEN the Jim Wilder Tug Boat Company, of San Francisco Harbor, contemplated building a new boat they looked for the latest wrinkles in design, as a law recently enacted by Congress permits considerable improvement in the building qualities of a boat on the same power.

The new boat has been arranged so as to float a little above her waterline while new, anticipating the trouble that arises when a boat gets water-soaked and goes down from four to six inches. The freeboard has been raised to the point where the water will not come on deck when she rolls in a cross sea in San Pablo Bay. Heretofore, when the ordinary boats have been crossing the troublesome water, the decks have been awash.

The workmanship on this vessel is doubtless some of the best in the vicinity of San Francisco harbor. The hull was built by the Gorham Engineering Company, to plans by D.

W. & R. Z. Dickie, and the engines by the San Francisco Standard Gas Engine Company.

The design finally developed into a single-screw tugboat with a combined engine and pilot house. The engine house is high enough to give ample headroom in the engine room, and the pilot house is forward of the engine house with an entrance from the pilot house into the engine room and an entrance on each side from the deck. The pilot house was raised above the deck in the final arrangement to give more height to the fuel tanks for gravity feed.

The model is of the straight stem, elliptical fantail stern type, with a bulwark all around, and a chock at the bow and stern. A heavy guard is worked all around. The scantlings are heavy and the boat is extremely well fastened so as to stand up under the hard work.

The forecabin is used as a boatswain's locker and is entered through a door in the

forward engine-room bulkhead. Two fuel tanks are stowed in the forecabin and two extend half way into the engine room.

The engine room is to be fitted with a six-inch centrifugal Underwriters' fire pump, arranged with a pulley to run on the flywheel. The after hold is fitted for stowing rope and perishable cargo when small packages are to be taken off to ships in the stream.

The deck is arranged to be clear with a railing all around for carrying passengers. The boat is arranged with a double Standard auto-steering gear on the top of the house aft for handling the boat when trying to clear the yards of a ship and the other in the pilot house for long towing work.

The engine is a three-cylinder marine San Francisco Standard Engine, 11¾ inches diameter, 15-inch stroke, turning 250 revolutions per minute. The fuel consumption is remarkably low, ranging from .0967 of a gallon per

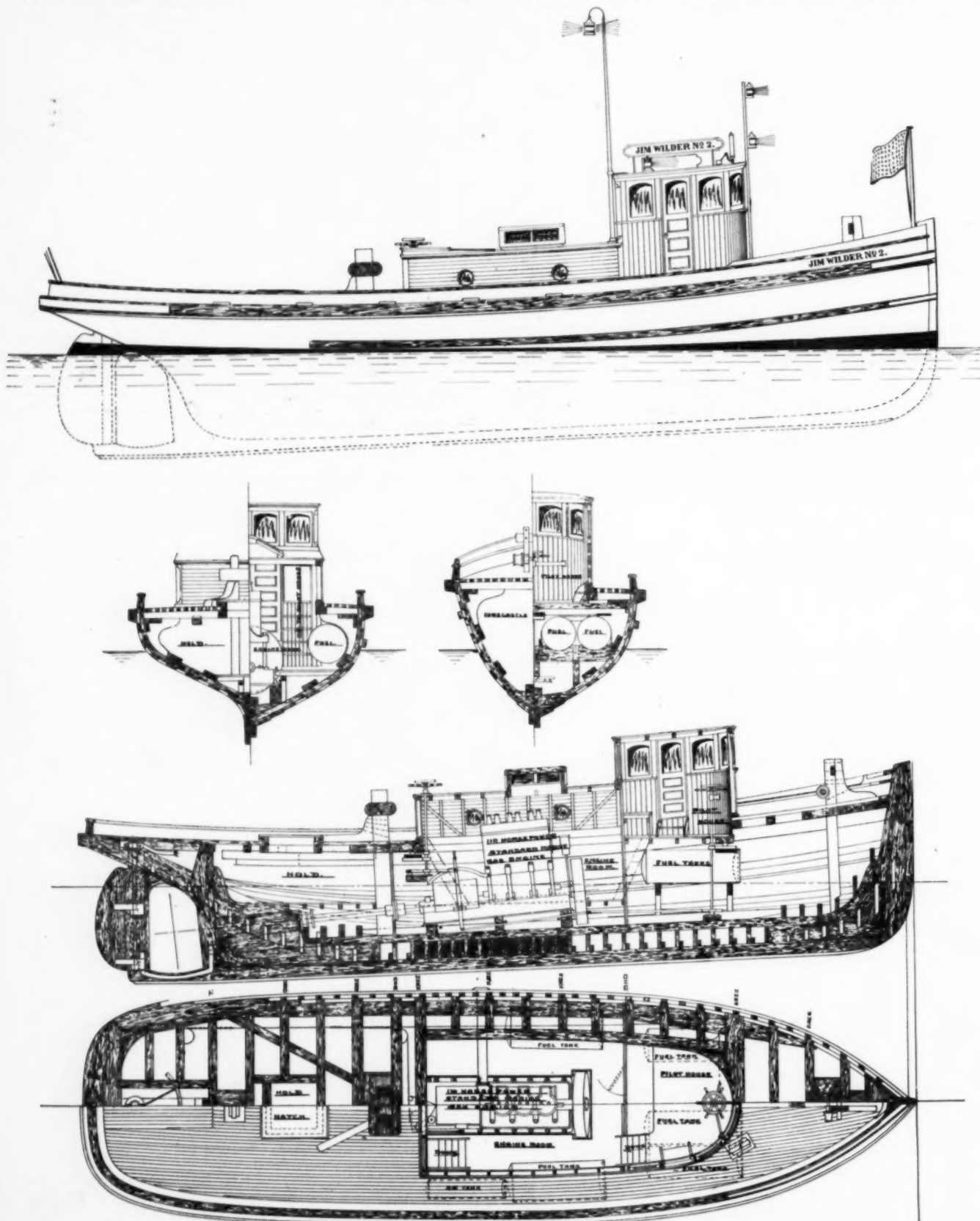
horsepower hour to .1077 of a gallon. The latter was the highest fuel consumption test obtained and upon one test the very low amount of .0915 of a gallon was consumed. This engine should run in the boat on a little more than 1/10th of a gallon per horsepower hour. The fuel used was what is sold on the market as Benzine 59.5 degrees Baumé at 60 degrees Fahr. and is lighter than the distillate which is used ordinarily in the boat. The inlet pipe for the auxiliary air is four inches in diameter and carried up to the deck so as to give free ingress to the air.

The boat throughout is built for business and gives that impression. The butts are large to cut down the expense of breaking the lines running over a small diameter. The cleats are made from a heavy pattern with a wide base to keep from upsetting with a side stream. The paulbitts are fixed so when two boats are towing tandem the line from the forward bitt to the towing bitt of the forward boat will not disturb the bitts and cause them to leak.

Essentially, the boat is a one-man boat, but the seat in the pilot house is so arranged that

where the boat is on a long tow the extra man sleeps on it as a berth.

The good draft and heavy lines of the craft can be noted from her profile view. Her freeboard is not high, but she is powerful and should pull very steadily in a running sea. When the hatches are battened down no injury can be done by boarding water, and she is especially fitted therefore for off-shore work. It will be noticed that the steering is controlled by a wheel turning in a horizontal plane in the pilot house, a system which has become popular for gasoline craft.



A new gasoline tug for the Pacific coast. Note her solid lines and good beam.

A 33-Foot Raised Deck Cruiser.

THE Seaman Motor and Launch Works, of Long Branch, N. J., have recently designed the raised-deck cruiser shown in the illustrations below. The vessel is 33 feet, 8 inches in length over all, with a beam of 8 feet, 8 inches and a draft of 2 feet, 4 inches. She has a headroom of 6 feet, 2 inches throughout and is a very comfortable boat in this respect.

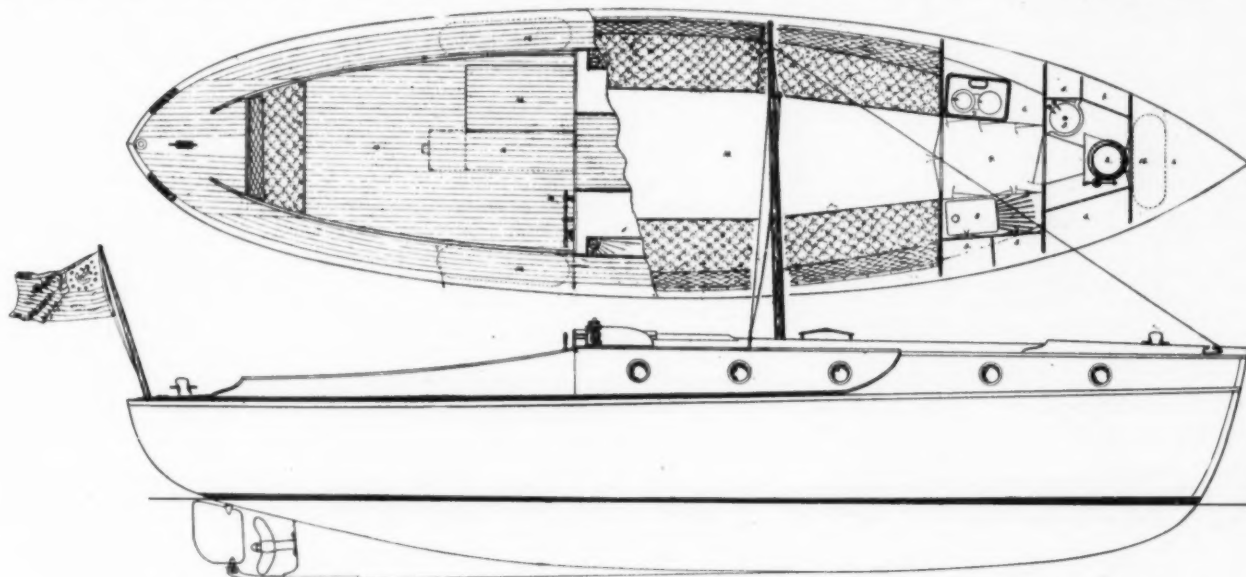
Forward is a toilet and three closets, and just aft of these is a roomy galley with a

coal stove, large sink, and considerable closet room. Aft of this is a cabin which may also be used as a stateroom, sleeping four persons on transoms and four in folding berths, so the boat may be made comfortable for a party of considerable size.

At the after end of the cabin is a watertight bulkhead and aft of this is a self-bailing cockpit 21 inches above the waterline. A seat is provided across the stern, leaving the remaining cockpit space free for the use of

chairs. The motor is placed under the floor of the cockpit and is rendered readily accessible through a hatch. The motor controls are extended to the steering wheel at the after end of the cabin upon the starboard side of the deck.

Water tanks below the floors are operated by air pressure, and the gasoline tanks are located under the decks on the cockpit floor. They are therefore in the open and any leakage will drain overboard through the scuppers.



A Seaman raised deck cruiser with a light draft. The motor is located under the floor of the cockpit.

A Thirty-two Foot Speed Boat.

THE plans shown below are those of a 32-foot racing boat designed by H. B. Pickering & Company, of Ann Arbor, Mich., for the Mr. C. Cox, of Houston, Texas. The idea was to obtain a boat as fast as possible for racing purposes and at the same time rendering it a safe and capable boat for express service when not in racing trim.

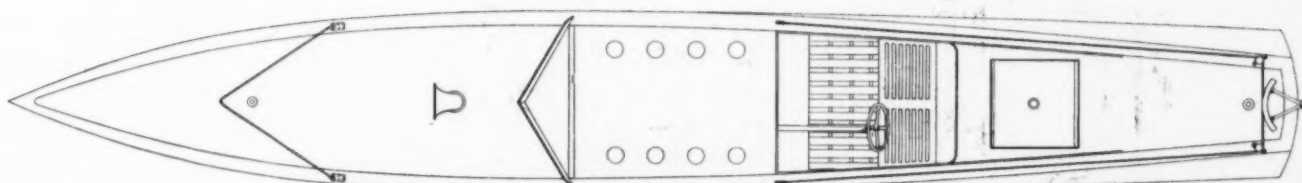
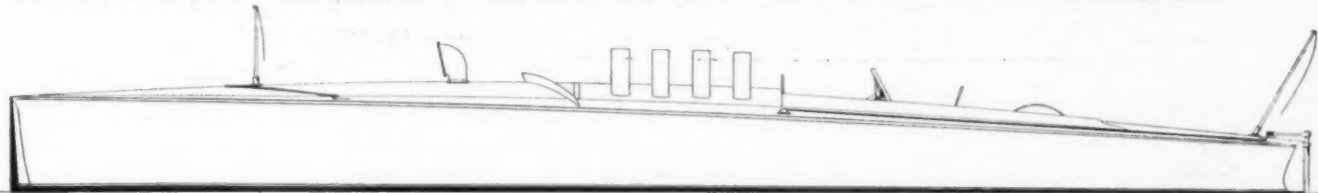
The motor is located forward under the flush hatch and is of the V type, with eight cylinders, developing 125 h.p. A compressed air starting device is used and the gasoline is also fed by pressure from a cylindri-

cal fuel tank. The spark and throttle controls are led to the steering wheel, so that even when racing the boat may be handled by one man.

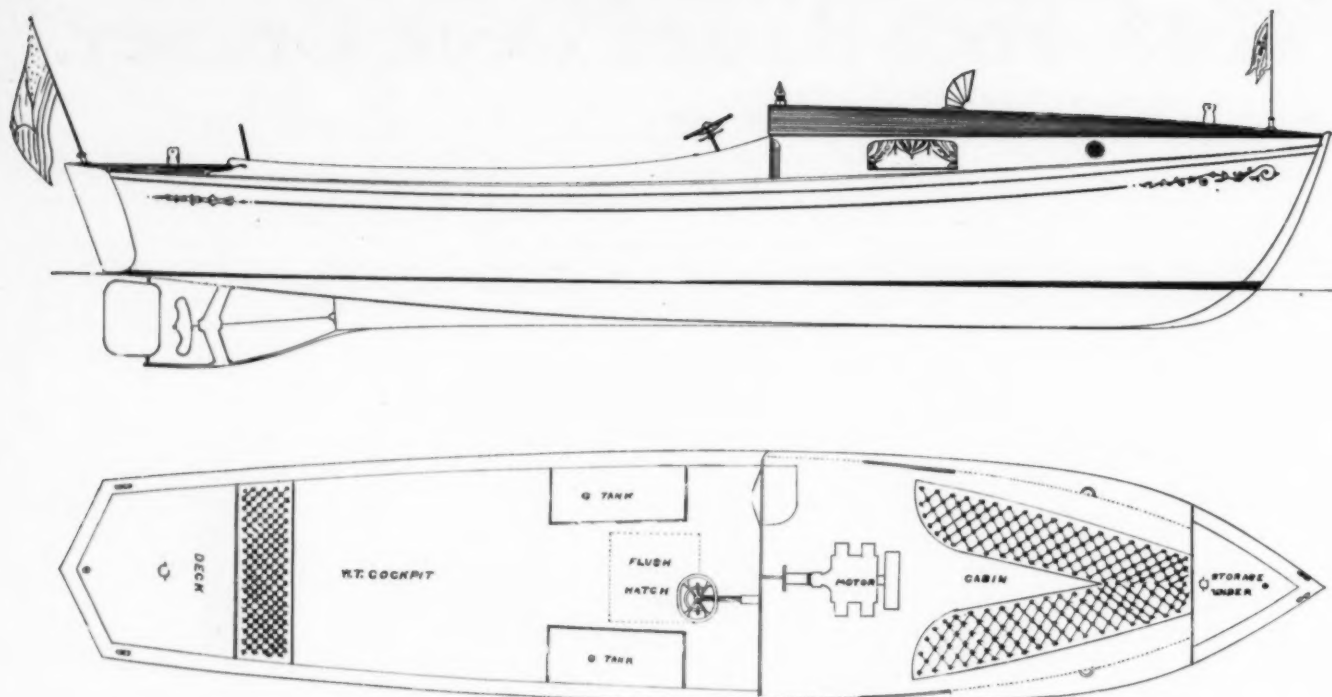
The hull is of light, but very strong construction, being trussed to withstand especially the shocks when traveling at high speed in a choppy sea. The planking is of $\frac{3}{8}$ -inch cedar laid ribband carvel over $\frac{1}{2}$ by $\frac{1}{4}$ -inch frames on edge, and all knees and web frames near the engine are of hackmatack. All full length keelsons and trusses are of spruce.

Decks are of scant $\frac{1}{4}$ -inch white cedar,

linen laid with a wide mahogany covering board. The bulkhead stern board and interior trim are of selected mahogany, while the decks are buff colored and the sides a glossy black. The dimensions of the craft are 31 feet, 11 inches over all; 4 feet, 6 inches extreme beam, and a draft forward of 10 inches. Her weight is about 19 pounds per horsepower, and in racing trim with her crew aboard she should show even more than her guaranteed speed of 30 miles per hour. The cockpit is small, seating only two persons, but there is considerable stowage space.



This craft was built primarily for racing, but sufficient attention was paid to the details of comfort to make her useful for fast day cruises.



A fast runabout and day cruiser design by H. B. Porter. 40 h.p. gives her a good cruising speed.

A Speedy Runabout Day Cruiser.

ABOVE is shown a design by H. B. Porter, of Norwich, Conn., for a fast runabout, day cruiser or ferry, 28 feet 5 inches over all, with a beam of 5 feet 6 inches, an extreme draft of 2 feet 1 inch, a freeboard forward of 3 feet 6½ inches, and a freeboard aft of 2 feet 4 inches. She has handsome and graceful lines and will drive easily with any power equipment up to 40 h.p.

Her good freeboard and the flare of her forward sections make her an exceptionally dry and comfortable boat, and as her cockpit is

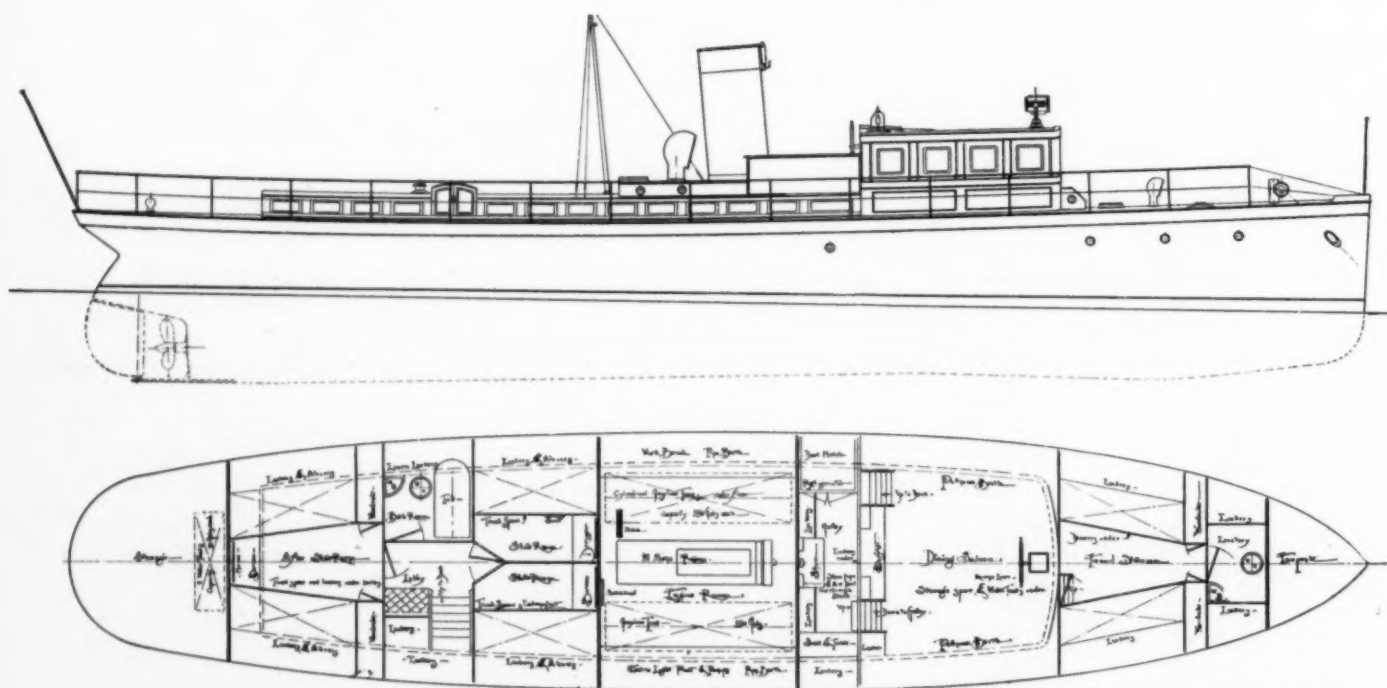
watertight and self-bailing, there is no fear of discomfort in any sea. The after end of the cockpit is provided with a wide seat with a high back, the remainder of the seating capacity of the cockpit being furnished by chairs.

Two fuel tanks of 30 gallons' capacity each are located at either side of the forward end of the cockpit. At the cabin bulkhead is the steering wheel with automobile control. The reverse gear and whistle are also at the steersman's hand. The power plant is thoroughly protected inside the bulkhead, and the cabin

is well lighted and ventilated by port holes and Pullman windows. A cowl ventilator upon the forward deck also aids in cooling the motor.

The frames of the boat are of medium weight white oak, with cedar planking copper fastened. The decks are canvas-covered, trim is of mahogany, and the panel work inside is also of mahogany.

The construction of this craft is such as to prevent her from squatting at the stern when under way, and she will ordinarily run upon a level keel.



A 65-footer complete for \$10,000. This craft was designed by L. Kromholz, of New York City, and built for an estate upon the Jersey coast.

A Staunchly Built Excursion Boat.

BELOW are shown the plans of a boat of heavy construction primarily for carrying large parties upon outings, principally fishing excursions, as the craft is particularly fitted for that purpose. The designs are the work of Fred Schlottmann, 301 Evergreen avenue, Brooklyn, N. Y., and the boat is 62 feet in length over all, with a beam of 16 feet and a draft of 3 feet, 4 inches.

The keel and frames are of oak and the decking is of pine. Her power is used somewhat in the nature of an auxiliary, as she will carry also a considerable amount of sail, a main sail and a jib. Her motor, however, is sufficient to drive her at a good speed and will doubtless be used much of the time. It is a Clifton, developing 65 h.p.

In order to suit the requirements of the sportsman, the stern of the craft has been made broad and free, and ample room is provided for comfort in all parts of the vessel. She has a good freeboard, and with her motor amidships she will be well balanced. The hunting cabin gives ample protection, and the deck house

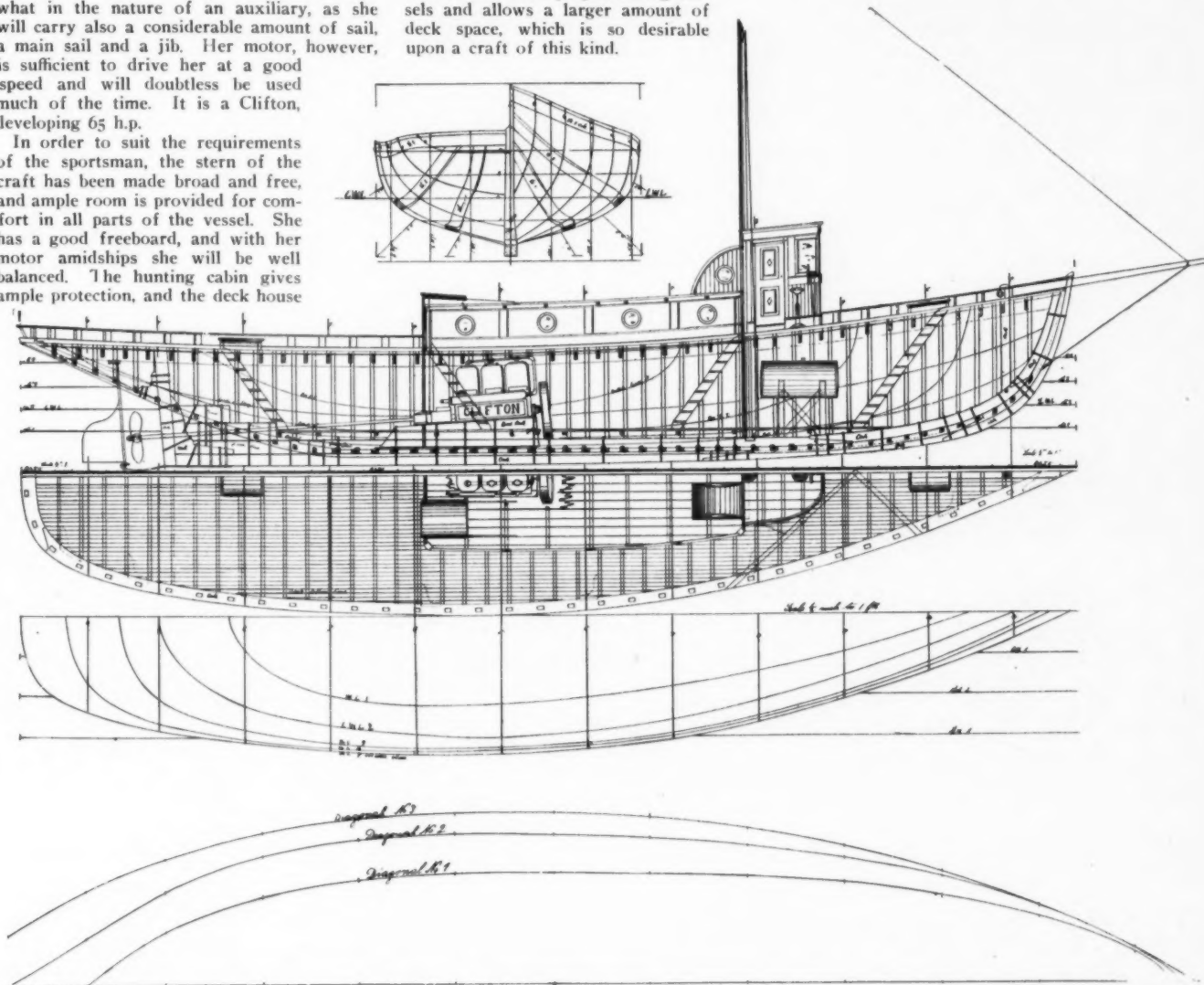
forward makes a comfortable place from which to handle the boat in heavy weather.

The gasoline tank is cylindrical and is installed forward in a compartment reached by means of a companion ladder from the deck. Entrance into the motor compartment is also provided by means of a ladder from the pilot house. Another entrance below decks is given from the after deck through a hatch.

The stern is of the fin type, which has been used so successfully upon sailing vessels and allows a larger amount of deck space, which is so desirable upon a craft of this kind.

The vessel, with her good freeboard and with her engine located as it is, well in the center of the craft, should be able to withstand a heavy sea. Her sail area will be useful, too, in running against heavy head winds, and will assist the steersman in keeping her course.

All of the deck space is available for use, except the part occupied by the deck house and the hunting cabin, almost one-third of the craft being of flush-deck design.



This 62-foot boat built by Fred Schlottmann, of Brooklyn, is of staunch construction and is intended to carry large parties.

A 65-Foot Trunk Cabin Yacht.

UPON page 56 are shown the plans of a 65-foot motor yacht which has just been designed by L. Kromholz, of New York City, for use in connection with an estate upon the Jersey coast. The vessel has a beam of 13 feet and a draft of 4 feet, 6 inches, so that, as can be seen from the arrangement plan, there is an unusual amount of comfortable accommodation below decks.

An arrangement somewhat out of the ordinary is the extra stateroom forward, with lavatory in the extreme bow of the boat. The crew are cared for in the engine room, sleeping accommodation being provided by pipe berths, and almost the whole of the remainder of the vessel is at the disposal of the owner and his guests. The motor room is amidships, the power being provided by a 50 h.p. Ralaco, which will drive the boat

at a mean speed of 12 miles per hour.

The galley, with ample locker space, is located between the dining saloon and the motor room, and is sunk a trifle below the level of the dining saloon. Under the floor of the saloon is a large refrigerator.

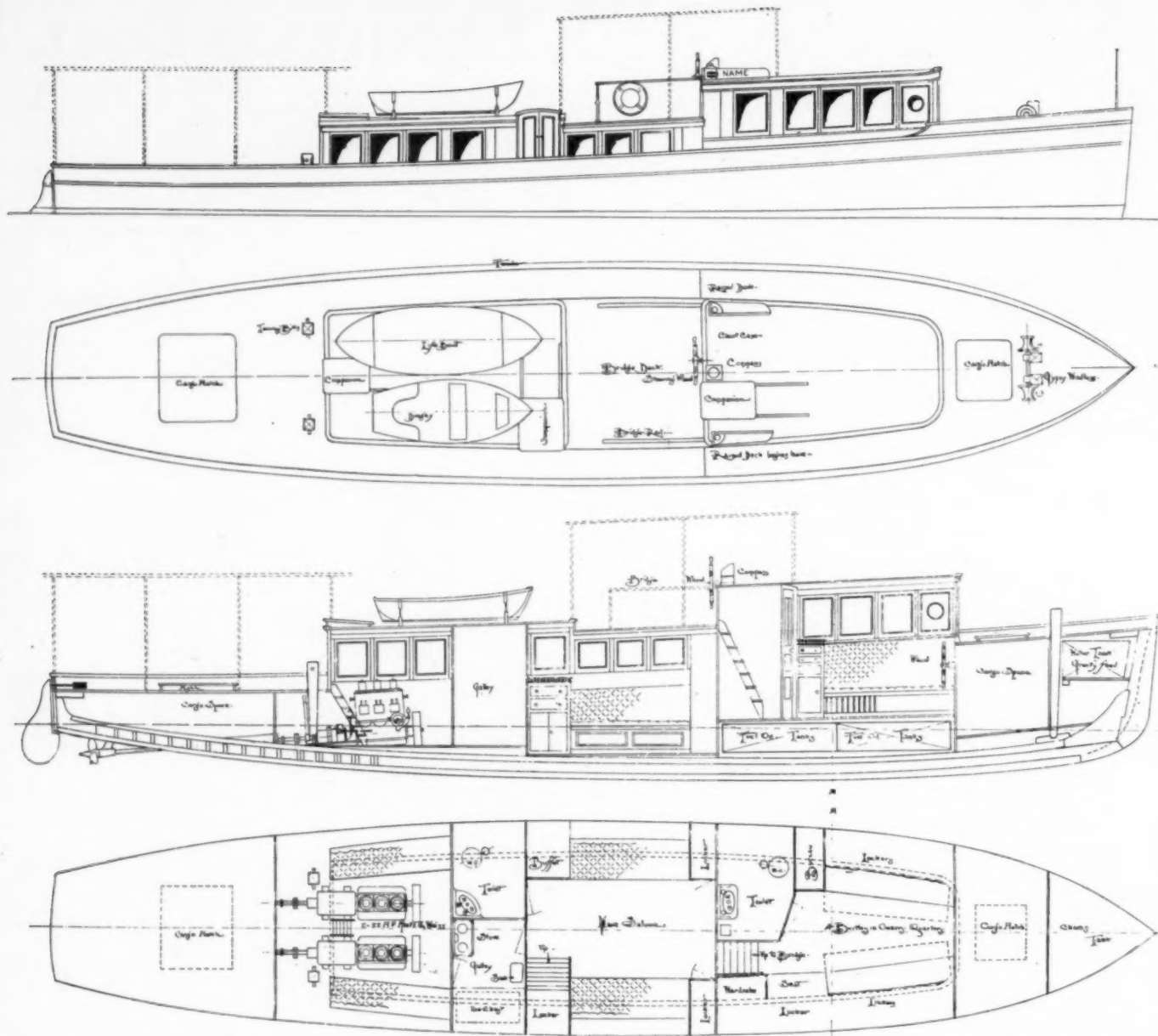
Aft of the motor room are two double staterooms, fitted with bureaus, both of which are entered from the lobby communicating with the deck. The port side opposite the lobby is occupied by the bathroom and linen lockers. Aft of this space is a large stateroom extending the full width of the vessel and furnished with two wardrobes. The stern is occupied by stowage space and two 50-gallon water tanks. The engine room contains two 350-gallon gasoline tanks, a capacity which will give the craft a good cruising radius. These tanks are cylindrical and are

placed under the floor. A complete electric light plant is also located in the motor room.

The craft is fitted with a hand rail all around the deck, and although much of the deck space is occupied by the deck house and the trunk cabin, there is sufficient room both forward and aft to accommodate large parties. A stack amidships ventilates the engine room and provides room for the mufflers, and a signal mast is stepped aft of the stack. Ventilation below decks is also furnished by two cowl ventilators.

Although the vessel is intended for service along the Jersey coast, she has a sufficiently light draft to enter the Lakes by way of the Erie Canal without cruising up along the coast, and she will without doubt be used to some extent in this region.

The cost of the craft complete was \$10,000.



This boat has been designed for the Canadian Venezuela Ore Company for use around Trinidad and the Orinoco River. She has a speed of 12 m.p.h.

A Venezuelan Working Boat.

THIS 60-foot twin-screw working boat for Barbacoas, Venezuela, was designed by J. Murray Watts, of Philadelphia, for Mr. W. B. Ford, manager of the Canadian-Venezuela Ore Co. This boat is used on the Orinoco River and has the high speed of 12 miles per hour, on account of the strong current in the river which runs from three to six miles an hour.

Two 22 h.p. Mietz & Weiss engines are installed, using Trinidad oil at a cost of about 10 gallons for a shilling. The fuel oil tanks are carried under the deck house forward and have a capacity of 800 gallons.

Owing to the tropical climate, the windows in all the houses are very large and the head-room is kept not less than 7 feet. The arrangement starting from the bow shows a chain locker and water tank in the fore peak, the water tank being sufficiently high for gravity feed. Next comes a cargo hold with a large hatch. The forward deck house is reserved entirely for the officers of the company and gives large locker space and sleeping accommodations for two with arrangement for hanging berths for two more.

A comfortable dressing-room and toilet is arranged on the port side and on the star-board after-end steps lead to the bridge deck from which the boat is steered and the engines controlled. There is also an emergency wheel located in the forward pilot-house from which the boat can be steered in bad weather; the forward windows having heavy shutters with one-inch thick bull's-eye ports in them so as to withstand a boarding sea.

Under the bridge deck is located the main saloon used as a dining-room and at times as an office. The galley opens into the dining-room and there is also a toilet room on the port side. Quarters for the crew are arranged in the engine room aft. There is a cargo hold occupying all the after end of the boat and space on deck for an available deck load.

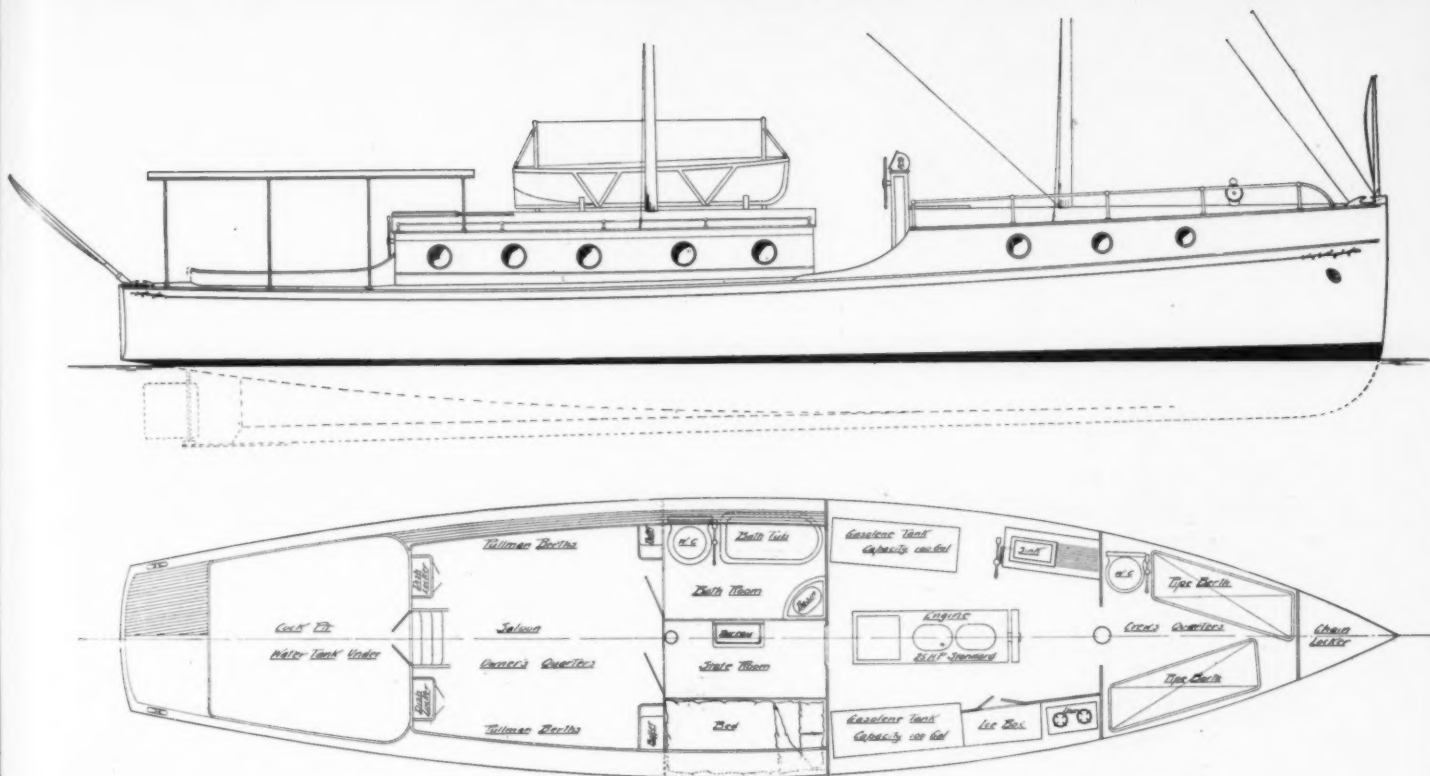
Owing to the lack of railway or steamship facilities, this boat will act as a means of communication between the various camps and depots of the mining company and also serve as a pay boat and floating office.

The boat is equipped with heavy oak docking keels so that she may run aground with impunity without damaging her twin screws.

The rudder is hung outboard so as to be easily removable for repair or inspection.

As this boat will be used not only for river work, but will have to run to Trinidad once a week, she is given seaworthy lines and a high flaring bow. The outboard shows a very simple and practical working boat with houses nicely balanced and an unobstructed view from the bridge. Two small boats are carried, built of galvanized steel of special design, one being a power life boat and the other a power tender. Several unusual arrangements have been made owing to the service in the tropics; the roofs of the cabins are lined with asbestos to reduce the tremendous heat from a tropical sun. The electric plant installed will not only furnish current for incandescent lights and a powerful searchlight, but also furnishes current for six 12-inch electric fans. A special electric blower will also be installed to ventilate the cargo holds.

There is moreover a very large ice-chest holding 400 pounds of ice which will be a feature much appreciated in those latitudes, the company having an ice-making plant at their main station.



The 50-foot cruiser designed by Ruddock and described below. She will be at the opening of the Panama canal.

Two Interesting Cruising Yachts.

THE cruiser shown above was designed and is being built by the W. F. Ruddock Yacht Works, 214th Street and Harlem river, New York City, for Mr. Max Philips, a New York yachtsman. She is 50 feet long by 10-foot beam, with a draft of 3 feet, 3 inches, and will be used in cruising to the opening of the Panama Canal. No expense will be spared in making this an ideal craft and a boat for comfort and seaworthiness.

The keel will be of white oak, as well as frames, floors, stem and stern-post. The stringers, keelson, clamps, etc., will be of yellow pine. The planking will be white cedar, 1¼-inches thick, fastened to frames by brass screws, with heads countersunk and plugged.

The deck house will be of mahogany, heavily built with paneled sides and ends. The deck

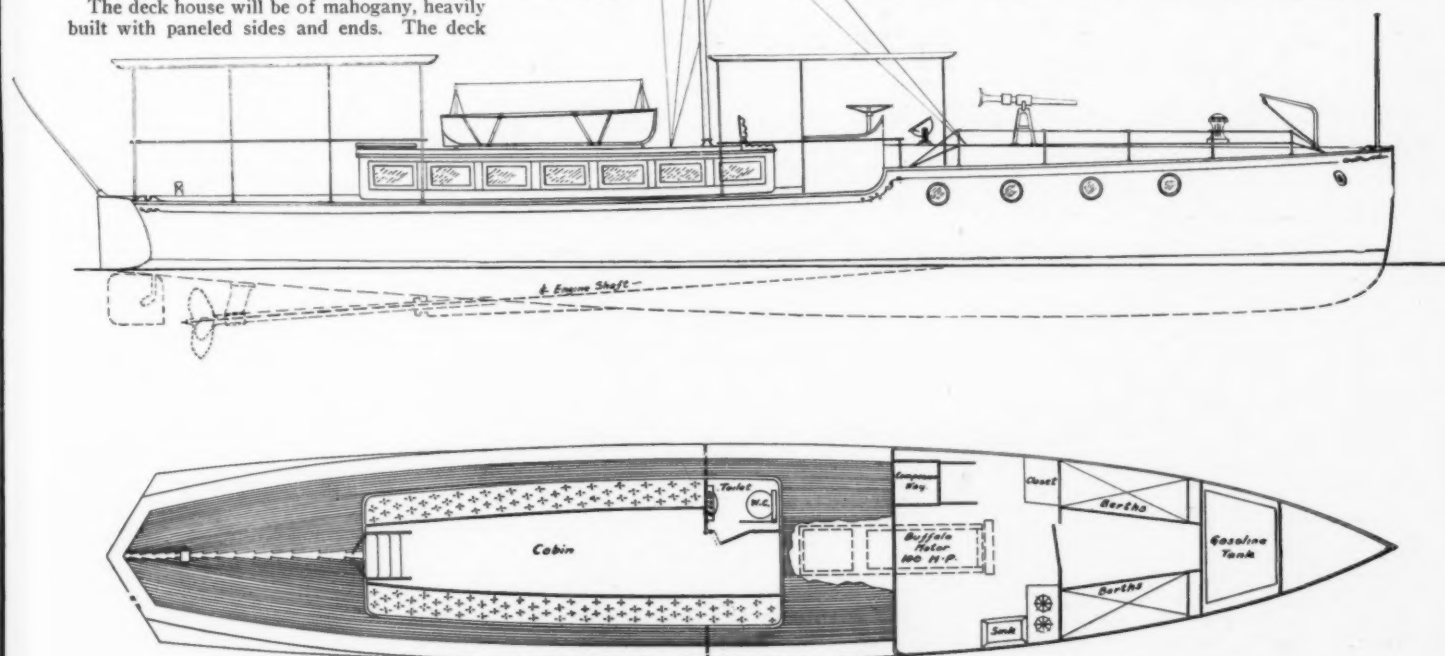
The interior of the saloon and stateroom and passageway is to be finished in mahogany and bird's eye maple. All partitions are to be paneled and between the carlings will be paneled in maple.

The stateroom will be finished the same as the saloon, with bureau, etc., and will have a parquetry floor.

The bathroom will be tiled with rubber tile and fitted with bath tub, basin and water closet.

The engine room will be located forward of the stateroom, and on each side of the motor will be located the fuel tanks. The engine will be a 25-horsepower Standard motor, controlled from the bridge. The crew's quarters and galley will be located forward and will have all conveniences. They will be finished in cypress.

One of the features of the boat is a watertight steel bulkhead, located aft of the engine. As this craft is built for sea cruising, she



A 60-foot high-speed craft for smuggler-catching in South America. She can carry 40 soldiers besides her crew.

will be fitted with two masts, running through the cabin and fastening into the keel. A power tender will be furnished and located where shown. All the hardware and fittings will be of heavy brass or bronze.

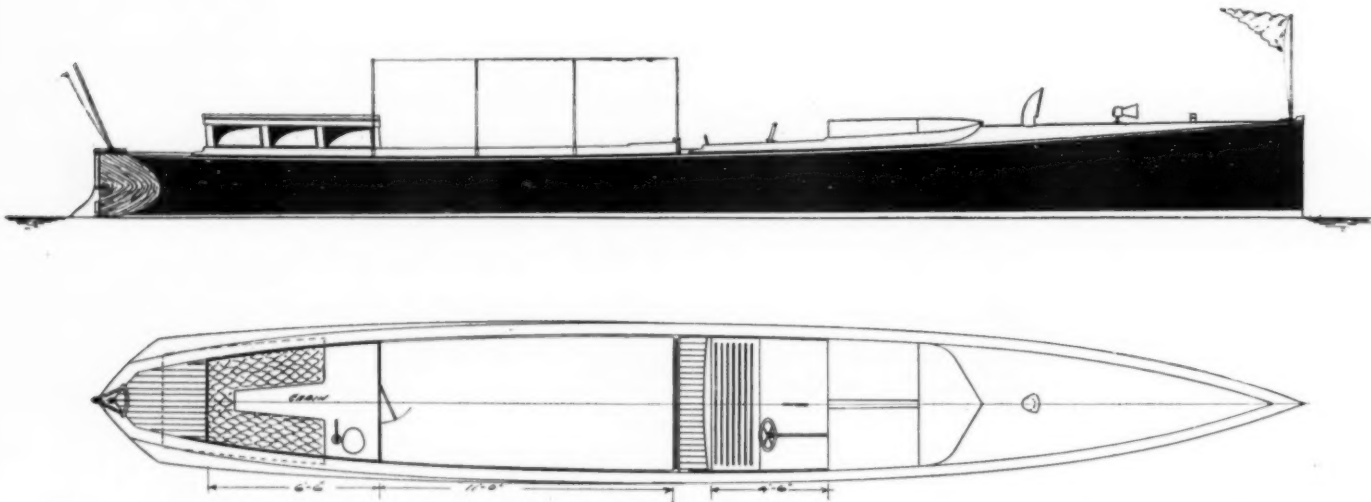
The stern will be built double, with mahogany on the outside and of the tender type. The rudder, skeg and all bearings below water are to be of Government metal. The bridge deck is to be so constructed that it can be raised to allow the motor to be removed.

The 60-foot high-speed craft, shown at the bottom of the preceding page, with the gun mounted in the bow, is to be used for a South American Republic for catching smugglers, and will be 60 feet overall by 10-foot beam and equipped with 100-horsepower Buffalo motors. This vessel is also designed by W. F. Rud-dock, and four will be built by the same firm.

She will be lightly constructed, but at the same time built stiff enough to withstand hard usage and to carry about 40 soldiers, besides the crew. Her keel, stem, deadwoods and

frames will be of white oak and her planking of white cedar, fastened by copper nails riveted over heads of burrs. Below the water the hull will be covered with sheet copper. The forward deck will have a high crown or "turtle back," and a bridge deck. The deck house will be built of mahogany and the decks of white pine, giving a good-looking and serviceable finish to this part of the boat. Inside, the finish will be of cypress, varnished.

This craft is designed for high speed and will make about 18 miles an hour.



The 45-foot "Rapier" described upon the following page. She has been designed particularly to combine seaworthiness and dryness.

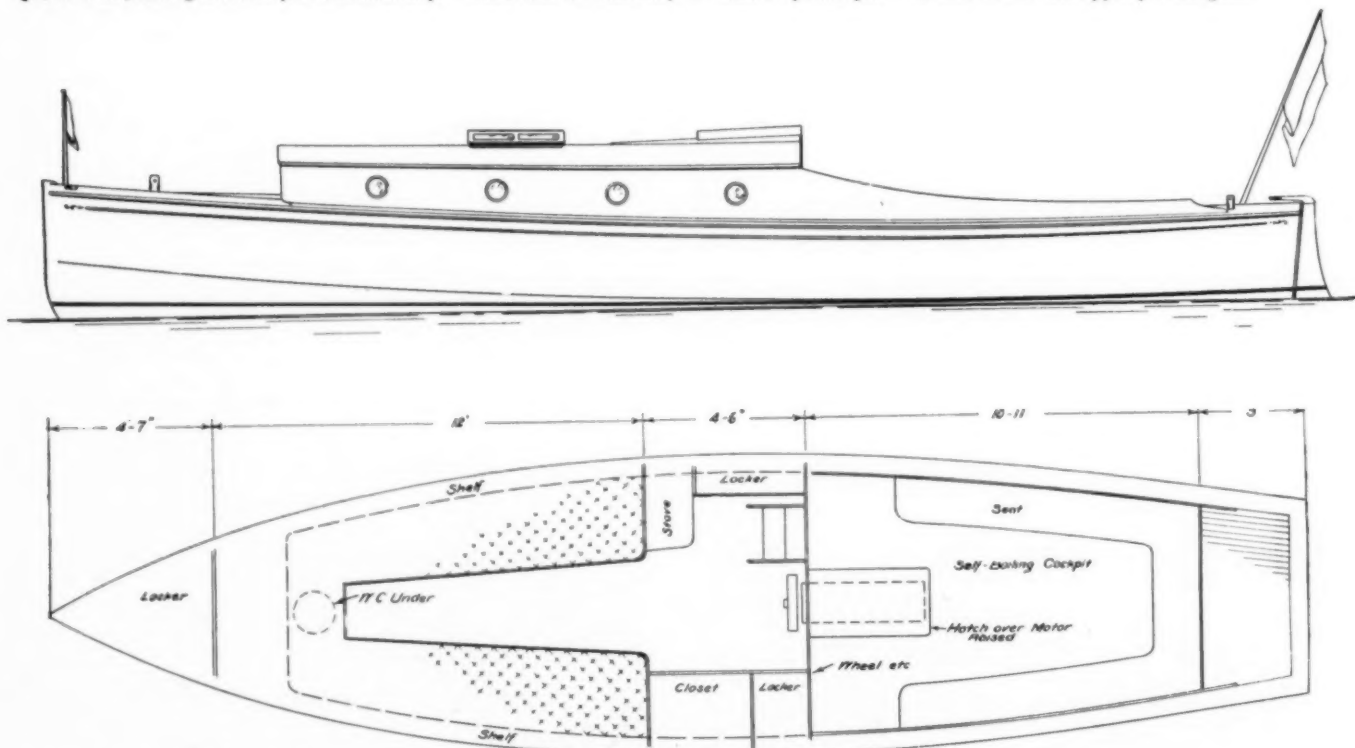
A 35-Foot V-Bottom Cruiser.

THE illustration below shows one of the new V-bottom cruisers designed by William H. Hand, Jr., of New Bedford, Mass. This is an attractive little cruiser and appeals particularly to the amateur because its construction requires no steam bending or other difficult work, and is comparatively simple to build, calling for no expert workmanship.

The craft is 35 feet in over-all length with an extreme beam of 8 feet 5 inches and an extreme draft of 2 feet 9 inches. The cabin accommodations are excellent and the boat can be driven at a good speed with moderate power on account of the shape of the hull. The seaworthiness of this type is a marked characteristic, and its efficiency is shown by the per-

formance of Sea Bird, the 25-foot V-bottom which crossed the ocean last summer.

The boat shown is one of Mr. Hand's latest designs. The cabin space is large and the cockpit is self-bailing with plenty of seating space. The motor is placed under the floor of the cockpit and is reached through a hatch. This is one of the best types yet designed.



A new V-bottom cruiser designed by William H. Hand, Jr. This is a type which appeals especially to the amateur builder, owing to its simple construction.

For the British Columbian Coast.

THE designs below are those of Firefly, a 45-foot, cruising yacht, designed and built by the DeFoe Boat & Motor Works of Bay City, Mich., for Mr. L. O. Garnet, Cobble Hill, Vancouver Island, B. C., and is one of the largest boat shipments ever to cross the continent. The beam is 11 feet, and had it been even a trifle more the railroad clearances would not have permitted the shipment. The boat was loaded on a 50-foot flat-car, and made a safe passage from Bay City to Vancouver in a little less than three weeks.

The cruiser is of a distinctly rugged type, being designed and built to withstand the rough usage

encountered along the British Columbian Coast. The boat will be used by Mr. Garnet for pleasure purposes along the coast as far north as Alaska. The boat left the DeFoe plant finished and completely equipped even to the slightest minor details. It was placed in the water and thoroughly tested out at the plant before being loaded for shipment, and when it reached Vancouver was placed in the water, provisioned and immediately started on an extensive cruise up the coast.

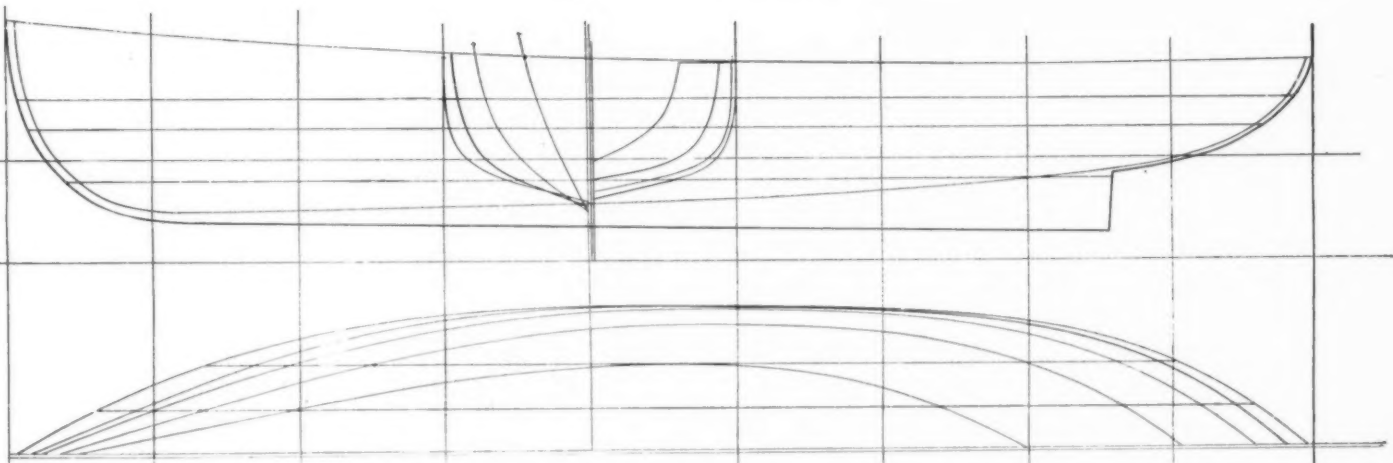
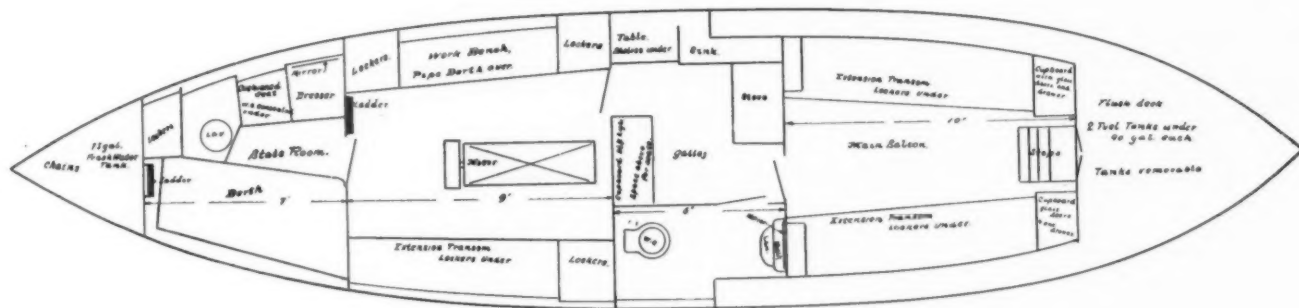
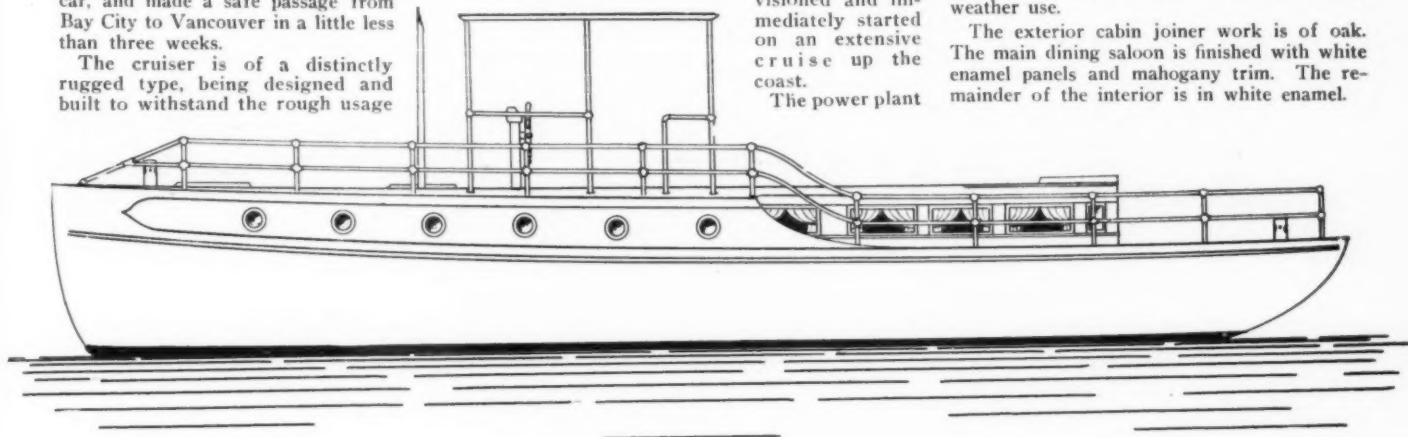
The power plant

is a 38 h.p., 3-cylinder, heavy-duty Stork motor; bore, $7\frac{1}{2}$ inches; stroke, 9 inches, developing its power at 325 r.p.m.

The boat is electrically lighted and provided with a large searchlight. Engine controls are all brought to the steering station so that the boat is at all times under the control of the man at the wheel.

With her low cabins and clean upper decks Firefly is distinctly a boat for deep-sea heavy weather use.

The exterior cabin joiner work is of oak. The main dining saloon is finished with white enamel panels and mahogany trim. The remainder of the interior is in white enamel.



Firefly, a 45-foot cruiser, was shipped overland from Bay City, Mich., to Vancouver, B. C., and is to be used as far north as Alaska.

Rapier, a Shelter Cabin Runabout.

RAPIER, the somewhat unique type of shelter cabin runabout illustrated upon the preceding page, was designed and built recently by the Luders Marine Construction Company, of Port Chester, N. Y., for Schuyler Schieffelin, Esq., of New York, who uses the boat extensively in ferry service on the Hudson River and as a day boat on the waters of Great South Bay.

This boat is 45 feet long, 6 feet wide and with a 90 h.p. motor has a sustained speed of 21 miles per hour.

The small cabin aft contains a toilet, transom, wash-basin and a small icebox, and has proven to be a very acceptable retreat during heavy thunder squalls.

Rapier is operated automobile style from the forward cockpit, which is separated from the

owner's space by a bulkhead and a drop windshield.

The model of this boat was worked out particularly with a view to obtaining extreme seaworthiness and dryness, and in this respect the boat has proven everything that could be desired. A removable canvas top covers the cockpit, and the entire space under it is left free for the use of wicker chairs.

A 110-Foot Steel Motor Yacht.

THE craft shown upon the preceding page is to be a handsome vessel, for Mr. Daniel Good, of Buffalo, N. Y., designed by Whittelsey & Whittelsey, of New York City, and will be built of steel and powered with triple-screw machinery. She is 110 feet over all, with a beam of 16 feet.

The design calls for a large type of center house, with a raised deck forward. This arrangement gives a large amount of deck room both forward and aft of the house, and a large bridge, which is located on top of the house, forward of the funnel.

There is a large dining saloon, about 23 feet long in the forward part of the house, and at the after part of the house is located the general saloon and lounging space.

The dining saloon will be handsomely fitted with a buffet, mahogany table, glass closets,

etc., and the after saloon will be furnished with cases, desks, a Victor machine, etc.

The engine hatch is located between the forward and after saloon, and is ample to give splendid circulation of air from the engine room. The exhausts pass up through this space into the funnel.

Below decks, this new vessel has one of the most commodious lay-outs of any craft of her size. The owner's stateroom is aft, directly connected to the owner's bath on one side of the passageway, and a stateroom on the other side.

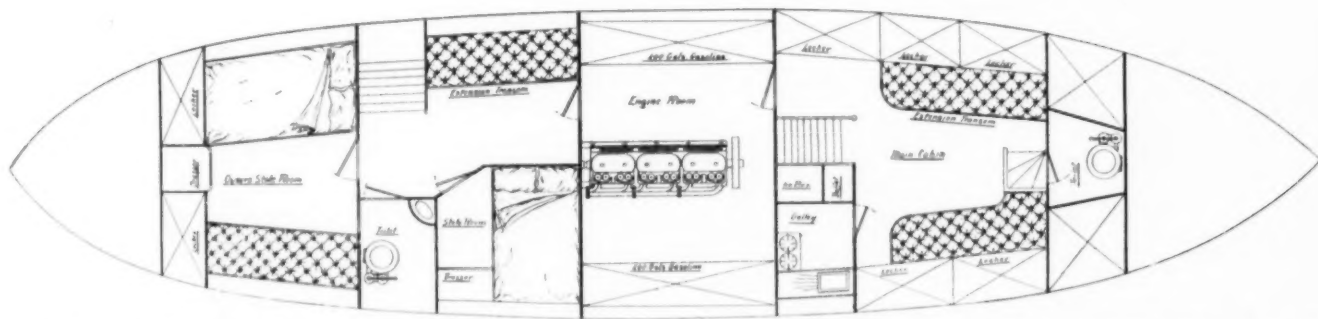
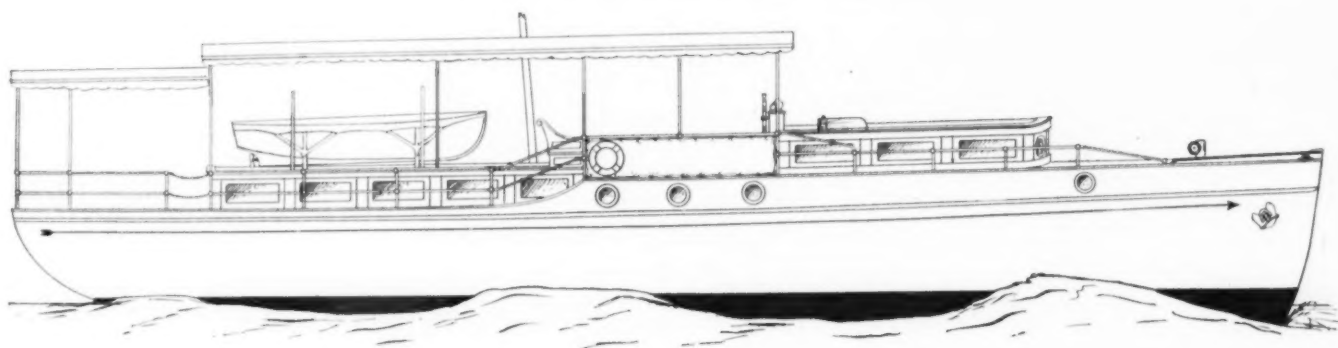
The guest staterooms are five in number, with proper baths and toilet accommodations. The entrance to the stateroom quarters is from the after end of the after saloon.

The engine room is in the center of the vessel, and is a large space, in which will be in-

stalled three 120 h.p. Sterling motors. A triple-screw equipment was preferred in order to run the boat slowly at times, with power efficiency. With all engines running full power, 16 miles an hour will be obtained, and possibly more. A speed of 14 miles an hour is expected with two engines and 11 miles an hour with one.

The galley and crew's quarters will be finished in V-groove North Carolina pine, and painted. These quarters are all ample.

The steel hull is of substantial weight, and is to be built by Kyle & Purdy. The vessel is to be fully electric lighted, and very handsomely furnished. The designers believe that Mr. Good will have a very satisfactory cruiser in this new boat, and one that will work in Florida, as well as along the Atlantic Coast and upon the lakes.



A 60-footer by the Niagara Motor Boat Company. Full headroom is provided in the cabins and she is very comfortably arranged.

A Sixty-Foot Cabin Cruiser.

THE plans shown above are for a new 60-foot cruiser by the Niagara Motor Boat Company, of North Tonawanda, N. Y. Comfort and seaworthiness are the keynote of the whole design. The beam of 14 feet permits of unusually spacious accommodations. The 60 h.p. motor is placed amidships separated from the living quarters aft and the main cabins forward by watertight bulkheads. It is worthy of note that full headroom is afforded in this compartment, making it unnecessary to crawl about the engine on hands and knees as is sometimes the case in the bridgedeck type.

The owner's quarters are located aft and sleeping accommodations are provided for three. All conveniences have been provided for, one of the features being a door opening directly into the toilet room. Another large stateroom is placed on the starboard side and

is provided with double bed, dressers and lockers.

The main cabin is placed forward under the forward house and the quarters here are light and well ventilated, owing to the large windows in the house sides. The galley which opens upon this cabin is one in which real food can be prepared and served without having to pass it up from a scuttle in the fore peak or out of the engine room.

Upon either side of the engine room is placed a 200-gallon gasoline tank, which will give the craft a cruising radius of considerable extent. The motor is a six-cylinder type.

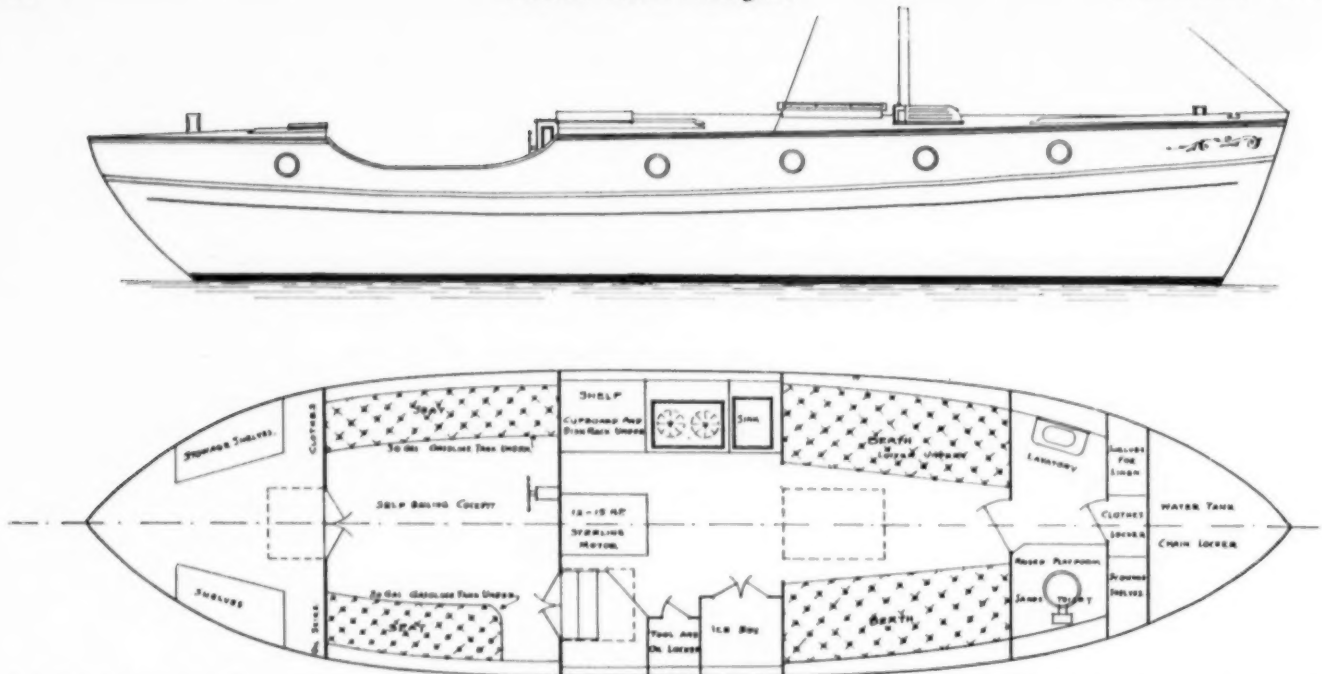
The after deck and the trunk cabin with deck space above, is covered as far forward as the after part of the main cabin by an awning. A seat is provided at the after end of the bridge deck just forward of the signal mast. A small boat is carried upon davits

above the after trunk cabin where it is easily reached.

A convenient feature of this craft is the location of a toilet forward in addition to the one opening from the after stateroom. This communicates with the main cabin and is placed in the center of the boat at the extreme bow next to the chain lockers. The main cabin is provided with ample locker accommodation above the extension transoms.

The boat is laid out so that the entire deck may be used for passengers. The side decks are two feet wide in the clear and the deck houses are low enough to be used as lounging places. The bridge deck is very roomy and makes a well protected place for the helmsman.

The general dimensions are: Length, 60 feet over all; beam, 14 feet, and draft, 4 feet 2 inches. A craft of this size can navigate most of the inland lakes.



A double-cabin, raised-deck cruiser designed by G. R. Richardson. She is of deep draft and good deadrise and is intended for small parties.

A High-Speed Cruiser.

BELOW are shown the designs of a high-speed cruiser which have been prepared by the Gas Engine & Power Company and Charles L. Seabury & Co., Con., of Morris Heights, New York City, for a Western yachtsman.

The remarkable feature of this craft is its extreme high speed for a boat of its size, 30 miles per hour being guaranteed. The length over all is 72 feet and the beam is 10 feet, 6 inches.

Forward are quarters for the crew, followed by a cockpit of the self-bailing type with air tanks underneath. The motive power consists of two 8-cylinder, 8 x 8-inch Speedway motors of 250 horsepower each, and the fuel tanks have a capacity of 500 gallons. These

are constructed of copper, with a watertight bulkhead forward and aft.

There is a galley of good size, and a toilet and stateroom for the owner as well as a roomy after cockpit. Air tanks are also furnished aft to make the craft non-sinkable.

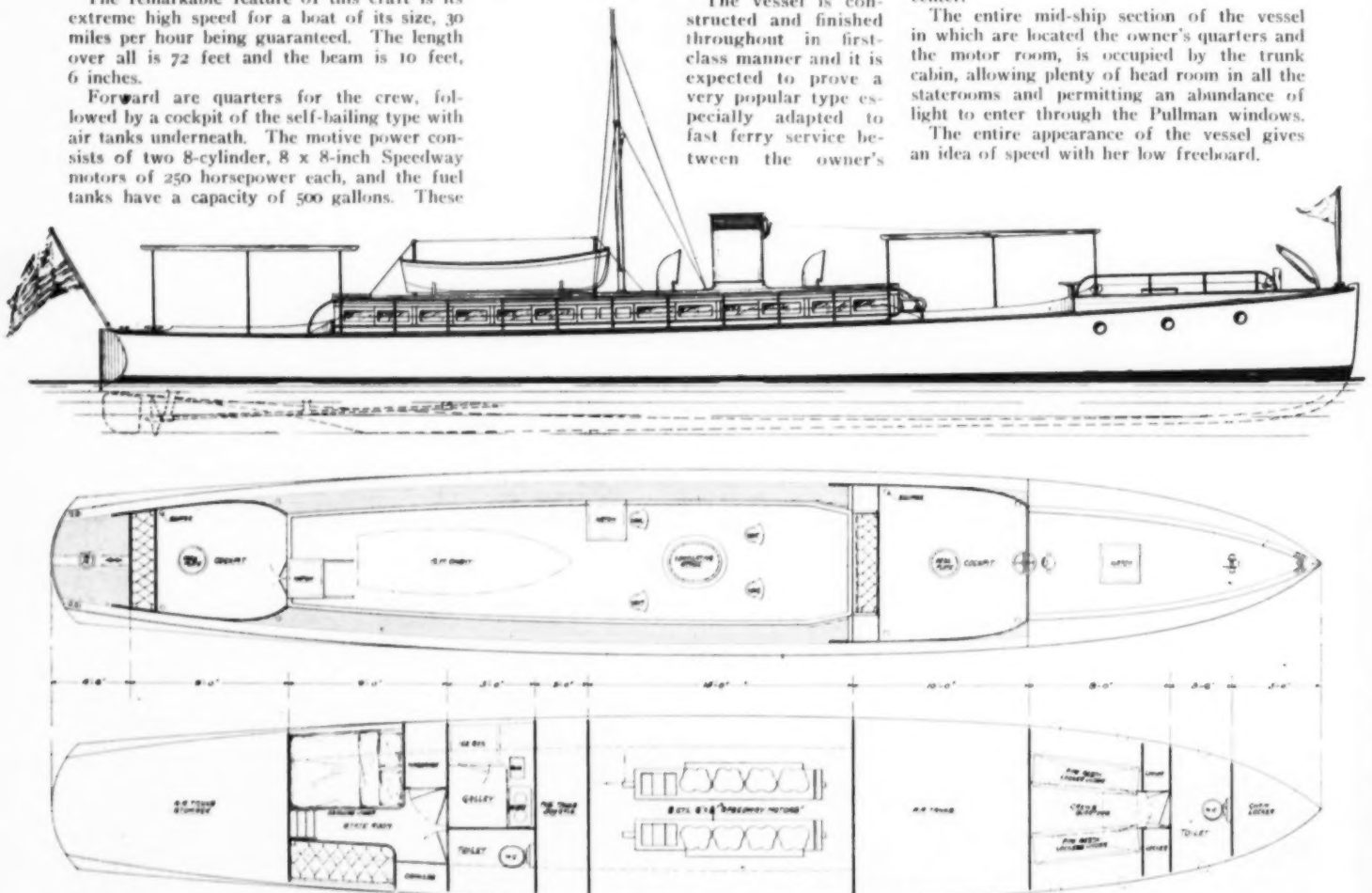
The vessel is constructed and finished throughout in first-class manner and it is expected to prove a very popular type especially adapted to fast ferry service between the owner's

country home and his business in the city.

The two cockpits both forward and aft, add to the appearance of the boat and furnish comfortable places to sit out of doors. The vessel is steered from the forward part of the forward cockpit by a vertical wheel in the center.

The entire mid-ship section of the vessel in which are located the owner's quarters and the motor room, is occupied by the trunk cabin, allowing plenty of head room in all the staterooms and permitting an abundance of light to enter through the Pullman windows.

The entire appearance of the vessel gives an idea of speed with her low freeboard.



A modern type of high-speed cruiser. This craft has been designed for a Western man and a speed of 30 miles per hour is being guaranteed.

A 35-Foot Bridge Deck Cruiser.

BELOW are shown the designs for a 35-foot bridge deck cruiser by the Tarrytown Boat Works of Tarrytown, N. Y. The craft has a beam of 9 feet and has been planned especially for cruising on the rivers in the vicinity of New York, and upon Long Island Sound. Her novel arrangement and pleasing lines will appeal to the motor boatman, as it is doubtful if any boat of her class contains as much available space.

The model of the hull is taken from the design of boats previously constructed by the same company; this type being essentially a "one-man" craft. The motor is placed forward under the bridge deck and is so arranged that the helmsman can see it at all times, and it is within easy reach should it require any adjustment. The reverse gear lever and engine controls are extended to the bulkhead at the side of the steering wheel.

Built in the bow is a 100-gallon copper

gasoline tank, aft of which is a watertight bulkhead. Extra gasoline tanks can be placed under the bridge deck if found necessary for a long cruise.

The forward cabin has two berths. This is a very comfortable cabin with a full headroom of 6 feet, 2 inches. The bridge deck measures 8 by 9 feet and is protected at the sides by a continuation of the sides of the forward cabin, and a railing. The wheel is at the center of the deck forward so that the steps to the forward cabin may be placed upon either side.

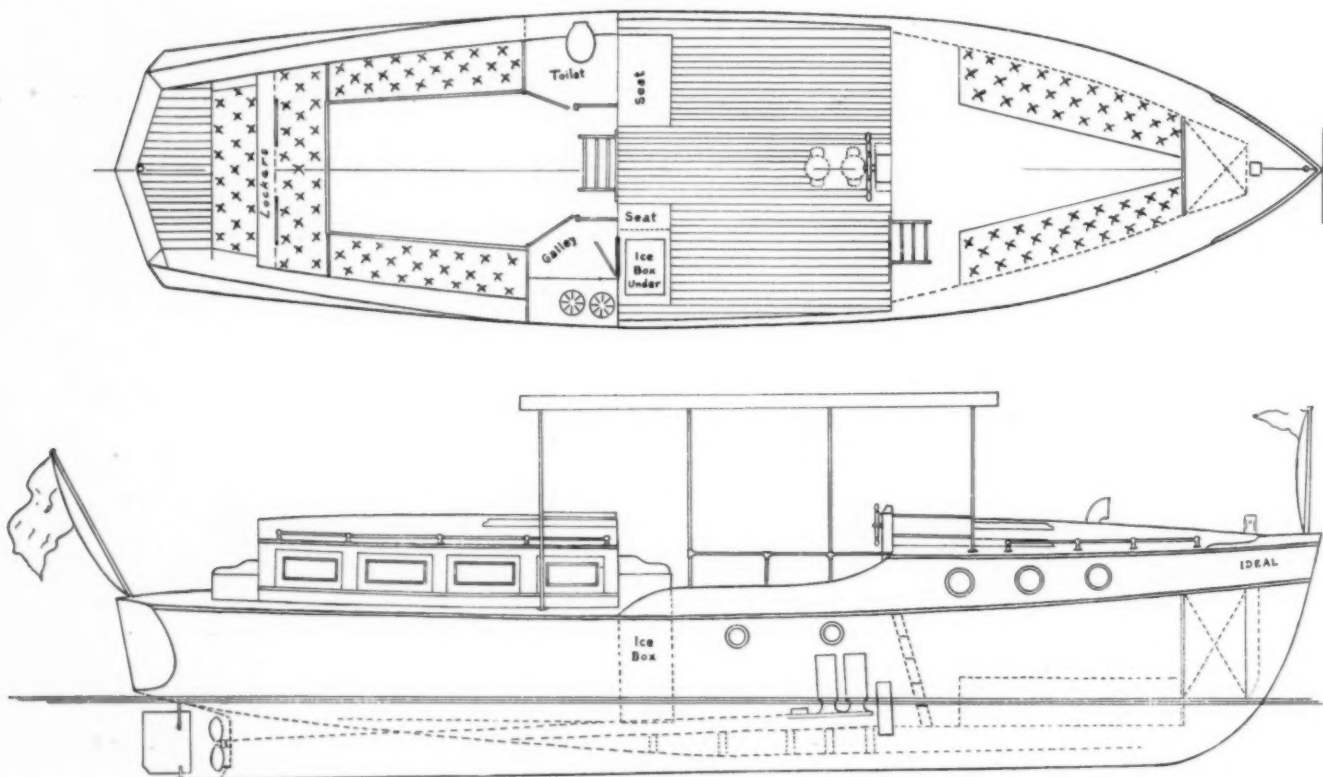
Upon each side of the after end of the bridge deck are two roomy seats with backs. Aside from this space there is plenty of room on deck for chairs and a folding table. Built in under the seat on the starboard side is the top of the icebox, which extends to the bottom of the berth inside. The seat cushion is removable and the icebox can be filled from the deck. The icebox is therefore made ac-

cessible either from the cabin or from the deck. A locker is built under the seat upon the port side.

The entrance to the main cabin is in the center at the after end of the bridge deck. Light and ventilation are provided by eight drop-frame windows. The galley and toilet are located opposite, leaving a large cabin with wide upholstered berths at the side and across the after end a double berth can be built in if found desirable to increase the sleeping accommodations.

Across the bulkhead at the end of the cabin are lockers with stained glass doors, and at the corners of the berths are two columns supporting a decorative arch.

Deck room is provided extending around the cabin with a hand rail upon the roof. A wide easy seat is built across the stern deck at the after bulkhead, which adds to the finish and pleasing lines of this commodious craft.



This Tarrytown Boat Works cruiser is novel in many particulars. Note the ample room in the two cabins and the out-of-the-way position of the motor.

A V-Bottom Speed Launch.

A DESIGN somewhat similar to the V-bottom express launch shown in the November issue of MoToR BoatinG by the M. I. Doyle Company, of 50 Church St., New York City, is shown upon the following page. This is the work of the same concern and is one of their latest products, a V-bottom speed-pleasure launch built to carry six to eight persons.

This craft is being built for Mr. W. M. Rountree, Secretary of the E. J. Willis Company, of New York City, and is to be equipped with a 12 h.p. Toledo motor, which is being especially constructed at the factory for this boat.

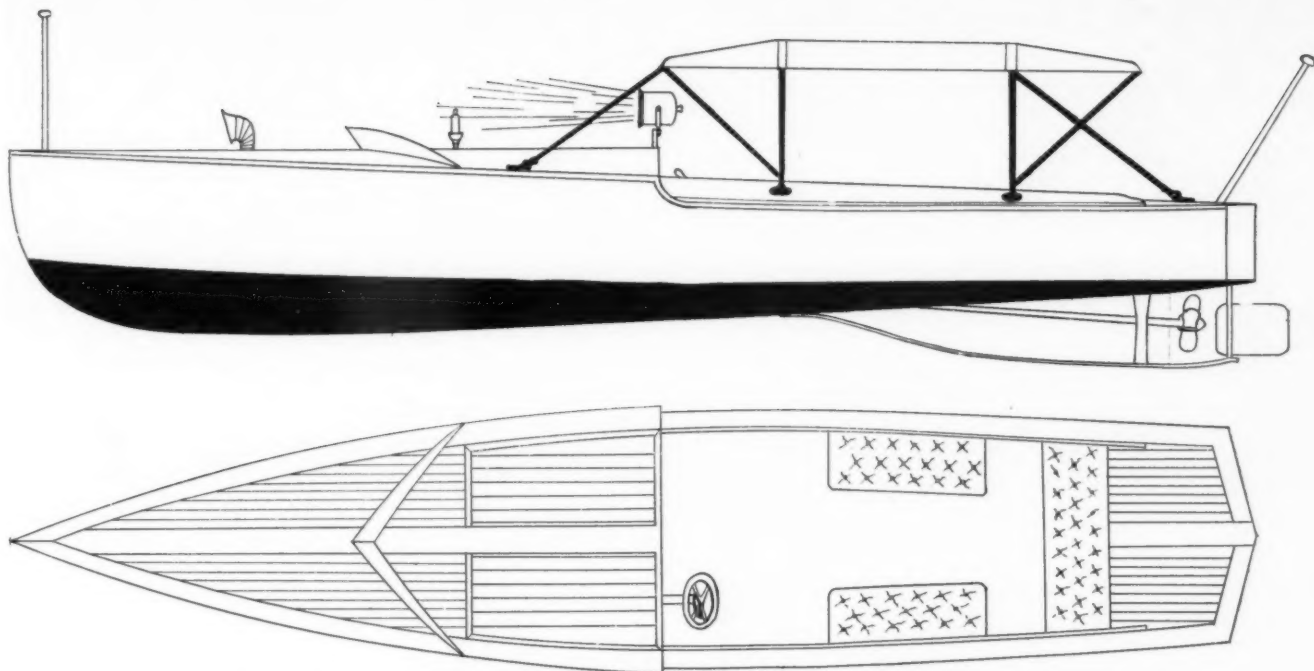
The boat has curved, flaring sides, instead of the ordinary straight type, thus permitting the spray to be thrown farther away and mak-

ing the boat much drier without in any way decreasing her speed. The M. I. Doyle Company have attained in boats of this design and built very similar to it speeds of 17 miles per hour with the same power in a 22-foot craft, and it is expected that this boat will make fully that speed.

The frames are of clear white oak, spaced nine inches at centers and the planking is of clear white boat cedar. The decking is of white cedar, laid in narrow strips, and the covering board, coaming, breakwater, etc., are of oak, all finished bright. The frames are especially strengthened at the engine bulkhead, three feet forward of this point, and three feet forward of the transom, by natural crook hackmatack knees, so the craft should prove a very staunch one.

The design is a slight modification of Mr. William H. Hand, Jr.'s Piute II. The M. I. Doyle Company are the New York representatives of Mr. Hand and are building boats solely from his designs, which accounts for the similarity of this model to others which have appeared from his board.

As will be seen from the plans, the motor is located about amidships under watertight hinged hatches, and the engine compartment is separated from the cockpit by a bulkhead to which is attached the steering wheel. The equipment of the craft will include a searchlight, a Kenyon auto top, a speedometer, a compass and a Yankee power whistle. Mr. Rountree expects to use the boat in the vicinity of Gravesend Bay, and she is sufficiently solid to withstand considerable rough weather.



A V-bottom speed pleasure launch with curved flaring sides. 17 m.p.h. is expected with 12 h.p.

A 43-Foot Raised Deck Cruiser.

THE plans that are shown below are from the designs of a 43-foot raised deck cruiser, built by the Racine Boat Company, of Racine, Wis., for Fred W. Leistikow, at Winnipeg, Canada, and she will be used in the waters near the owner's home.

The engine is located forward under the raised deck and the engine room is equipped with a pipe berth upon the port side. The motor extends under a portion of the bridged deck and is so placed that it occupies only space which would not otherwise be available.

The after cabin is enclosed entirely in glass and is entered from the center of the after part of the bridged deck. The stateroom in the forward part of this cabin contains two extension seats and a drop leaf table, in addition to two lockers. Aft of this is another stateroom containing a Pullman berth and a

table. Opposite this and opening from it upon the port side is a toilet and two lockers.

The after part of the cabin is occupied by the galley and a flight of steps leads from this to a small after deck.

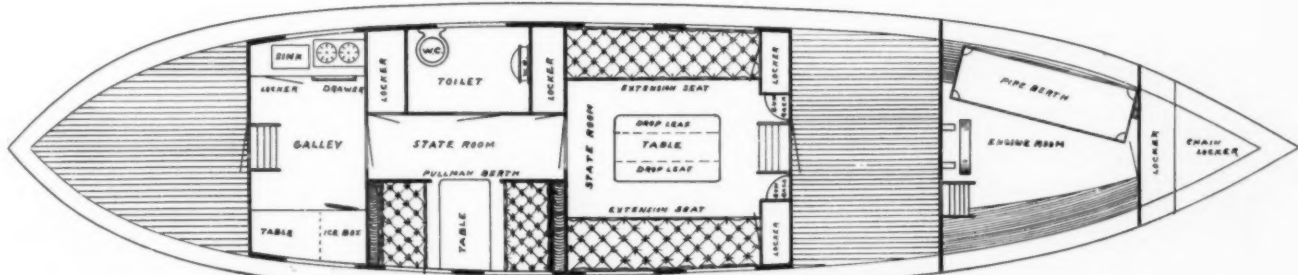
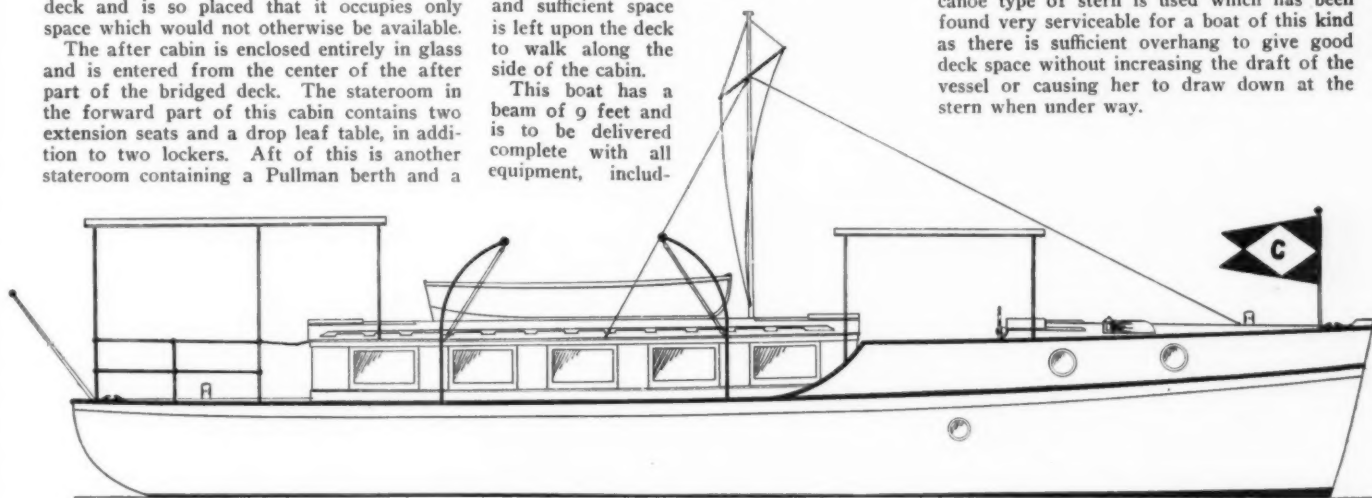
A life boat is carried upon davits above the cabin and a signal mast is stepped amidships just aft of the bridge deck. A hand rail extends along the top of the cabin upon either side of the vessel and sufficient space is left upon the deck to walk along the side of the cabin.

This boat has a beam of 9 feet and is to be delivered complete with all equipment, includ-

ing an electric light plant. The power will be furnished by a 40 h.p. Sterling.

This type of boat has become very popular for use upon the inland lakes and the rivers of this country as the high freeboard makes the craft a dry one and the location of the two cockpits allows plenty of space for large parties to find accommodation above deck.

The cabin is large and well lighted and can be closed entirely in unpleasant weather. The canoe type of stern is used which has been found very serviceable for a boat of this kind as there is sufficient overhang to give good deck space without increasing the draft of the vessel or causing her to draw down at the stern when under way.



One of the latest Racine designs, a raised deck cruiser with a glass after-cabin. She will be used in Canadian waters.

Motor Boats of Stock Design.

Typical Examples of Stock Boat Construction with Prices and Specifications. What the Lines of the Various Manufacturers in This Field Comprise.



Seabury 30-ft. Runabout.



Bug—a 16-ft. Elcoplane.



Peter Pan, Jr. A \$1500 Reliance Stock Model.



A 35-Foot Elco Express; Speed, 24 Miles.



Reliance Mahogany Runabout 23' x 4'6".

Speedway Runabouts.

The Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated, Morris Heights, New York City, manufacture a stock boat of the runabout type, which is built in three sizes, 20, 25 and 30 ft. long respectively. The largest size is the most popular and orders for these are numerous and frequent. The length over all is exactly 30 ft., the beam 6 ft., and the draft 2 ft. 2 in. The boat is planked with cedar and oak planks and is copper riveted. Decks, coaming, covers over motor and interior trim are of selected mahogany. Controls to motor are on steering wheel, as in automobile practice, and a reversing lever is arranged at this point, thus bringing the entire operation of the boat under the control of one person. The equipment includes leather covered cushions and upholstered back for thwart seat, four wicker armchairs with leather cushions, linoleum floor, brass deck furnishings, etc. The power is a four-cylinder, four-cycle, 18 to 22-h.p. Speedway, arranged with jump-spark ignition, and equipped with magneto or dynamo storage battery and dry batteries, McCord force feed oiling system, copper fuel tank set in copper pan, outside copper feed pipe, Tobin bronze propeller shaft, bronze propeller wheel strut and stern bearing, power whistle outfit. The speed with this engine is 14 to 15 miles per hour.

Elco Motor Boats.

The Electric Launch Co., Bayonne, N. J., are the makers of 16-ft. Elcoplanes, of which Bug is perhaps the most famous example. The company are prepared to furnish the Elcoplanes in 1912, in two sizes, 16 and 20 ft. respectively. The speed guarantee under which these boats are constructed and sold is decidedly remarkable, as it is 30 and 35 miles per hour. The furnishing of stock boats with a guaranteed speed of 35 miles per hour illustrates perhaps better than anything else the development which the hydroplane has attained. It should be born in mind, however, that these boats known as Elcoplanes are quite distinct from the typical hydroplane. The 16-ft. type is powered with a 40-h.p., 4-cylinder Elco gasoline motor, hull is finished throughout in mahogany, bottom of boat is equipped with patent Elcoplanes, and the boat with full equipment ready for service and with a guaranteed speed of 30 miles or no sale, is sold for \$3,500. The 20-ft. type is powered with a 60-h.p., 6-cylinder Elco motor, is similarly finished and equipped and sold with a 35 mile per hour guarantee for \$5,000. The company have long made a specialty of the well-known Elco express launches, which are made in the following types and sizes: 28 ft. runabout, equipped with 40-h.p., 4-cylinder Elco gasoline motor, guaranteed speed 20 miles or no sale, with full equipment ready for service, \$2,000; 35-ft. Elco Express, equipped with 60-h.p., 6-cylinder Elco gasoline motor, hull built entirely of mahogany, guaranteed speed 24 miles or no sale, with full equipment ready for service, \$4,000; 40-ft. Elco Cruiser, with 20 h.p., 4-cylinder Elco gasoline motor, used for cruising accommodations, berths being provided for seven, best of seaworthy qualities, highest grade construction, with full equipment, ready for service, \$4,500. Further information concerning the products of this company may be obtained by addressing The Electric Launch Co., ELCO Works, 201 Avenue A, Bayonne, N. J.

Reliance High Speed Boats.

The stock speed boats of the Reliance Motor Boat Company, New York City, include boats of various sizes, all of beautiful finish and high speed. Of these, the mahogany runabout Peter Pan IV is the most famous example. This boat is built entirely of mahogany, the planking being 3/4-in. selected mahogany—batten seam construction, with full length battens. The decks are of narrow strip mahogany with yellow inlaid seams. The hardware is all polished brass, and the polished brass cutwater is extra wide. A passenger cockpit with two thwart seats, one for steering and one across after end, is roomy and commodious. The lazy back seats are beautifully upholstered. The cockpit is furnished with two handsome wicker armchairs. All the seats are cushioned with finest grade pantosote. The cockpit floor is covered with Wilton velvet rug. Spark and gas controls are located on the brass auto steering wheel. The foot space in front of the chauffeur's seat is covered with pyramid aluminum, bound with brass. The machinery comprises Continental 4-cylinder, 40-h.p. 1911 motor, with special starting device (polished brass starting crank coming through dash board). Special Splitdorf magneto with vibrator coil, Paragon clutch, 2 1/2-in. copper exhaust, running through boat with exhaust at stern transom above water, with no joints, all in one piece. A special racing exhaust equipment is carried straight up through two handsome polished copper funnels. Peter Pan IV is said to be the fastest runabout of her power in the world. Her speed is 27 miles, and boats of this type may be bought for \$3,000. Other products of the Reliance Company include 21 ft. by 4 ft. 6 in. runabout with 35-h.p. motor, giving 24 miles per hour, \$1,500. 21 ft. by 4 ft. 6 in. speedabout, 20-h.p. Reliance motor, giving 18 miles an hour, \$950. 23 ft. by 4 ft. 6 in. runabout, 24 to 28-h.p. Falls motor, giving 16 miles per hour, \$1,100. 23 ft. by 4 ft. 6 in. mahogany runabout, 24 to 28-h.p. Continental motor, giving 20 miles per hour, \$2,000 complete. 28 ft. by 4 ft. 3 in. mahogany de luxe runabout, with 40-h.p. Continental motor, giving a guaranteed speed of 25 miles per hour, \$2,750 complete.

Niagara High Grade Runabouts.

The principal dimensions of the Niagara High-Grade Runabout, built as a stock model by the Niagara Motor Boat Co., North Tonawanda, N. Y., is 28 feet in length by 4 feet 10 inches beam.

The novel use of the raised deck idea affords an unusual amount of freeboard, which together with the pronounced flare to the forward sections assures a dry, comfortable and seaworthy outfit. The motor is installed forward under a hatch and is controlled from bulkhead on which is mounted auto steering wheel and within easy reach of operator the rear starter and reverse lever are also placed. The hull is planked with white pine and is copper and brass fastened throughout. This model may be purchased for \$700, at which price cushions, steering gear, floor covering, fittings and tank will be included. A new Niagara line is complete in all particulars including everything from row boats to 80-foot cruisers, and the prices range from \$50 to \$10,000. Those desiring to build their own boats will be pleased to learn that they can purchase frames and material for any one of these models at a very low cost.

The Cuthbert Regulars.

The boats supplied regularly to the trade and to individuals by A. G. Cuthbert & Co., naval architects and builders, Chicago, Ill., include fishing boats of 13, 14, 15 and 16 foot length, which cost from \$16 to \$20 a piece; Dory type dingies, 15 and 16 feet, \$18.50 to \$24; smooth skin rowboats, 13 and 15 feet in length, at \$22 and \$26 respectively; clinker row boats of cedar with square stern, 14 and 16 feet in length at \$30 and \$35 respectively; a 16 foot 2 1/2 H. P. motor boat, complete for running, at \$66; an 18 foot 4 H. P. Torpedo model V Transom at \$265; a 20 foot 4 H. P. Torpedo model V Transom boat at \$320; a 22 foot 6 H. P. Torpedo model V Transom boat at \$410; a 26 foot motor boat complete with 10 H. P. two-cylinder motor at \$665. Larger sizes and types of boats are built to contract, as per individual specifications.

The Knox Yawl Dory Launch.

The Camden Anchor-Rockland Machine Co., Camden, Maine, are manufacturing the Knox Yawl Dory Launch to meet the constantly growing demand for a strong seaworthy and up-to-date boat at a moderate price. These boats are built strictly on their merits by native Maine boat builders who have built boats all their lives. The material used in their construction is native Maine stock and is sufficiently strong to stand buffeting in the most severe weather. The aim of the company has been to combine all the merits of the old reliable dory, with the fine sea and easy driving qualities of a ship's yawl. These boats are also excellent for rivers and lakes because of their flat bottoms and shallow draft. Before ceiling the interior of the hull is thoroughly painted with lead paint. After completion the remainder of the woodwork is carefully rubbed down, and either filled and varnished or painted. Knox Yawl Dory Launches are built in five sizes, ranging from 19 to 30 ft. in length, and in three grades, all using the same molds, but differing as to refinement of finish, fittings, etc. The largest sizes may have half or full cabins fitted to them. All types may be bought with or without engines. The prices for the 30-ft. size, which has a beam of 7 ft. 2 in., are as follows: Hull, fittings and tank, Grade A, \$840; Grade B, \$400; Grade C, \$300; with 11-h.p. 2-cylinder engine, Grade A, \$885; Grade B, \$740; Grade C, \$640; extra for either type cabin, Grade A, \$130; Grade B, \$105; Grade C, \$85. Reverse clutch, \$70 extra.

The Breese Hydroplane.

S. S. and R. P. Breese, 38 East Twenty-third Street, New York, designers of motor boats and gas engines, are the designers and owners of the well-known racing hydro "Breeze 1." The firm make a specialty of hydroplanes, including a 14-ft. hydro, equipped with a 24-h.p. motor and having a speed of 30 miles an hour. This boat they offer at \$1,000 complete. All the hydroplanes built by this firm are constructed especially to order and are of the very finest workmanship and material to be had on the market to-day.

The Cape Cod Power Dory.

The Cape Cod Power Dory Co., Wareham, Mass., have for a long time made a specialty of the power dory which bears their name, and is designed by Gurney. To these boats their makers have attached the slogan "Ride the Sea Like a Duck, but Never Dive." The Cape Cod Power Dories are built in 16, 18, 20 (special), 22 and 24 ft. lengths, and all have cabin over after end. They should not be confounded with the cheaply constructed so-called dories, as they are more of a family motor boat. It is the claim of their builders that they cannot be beaten by any small boat for seaworthiness and comfort. The bow, very full on deck, and sharp on the waterline, makes them easy to drive and gives them great lifting qualities in a seaway. They are equipped with Palmer or Ferro motors, as desired. The firm specialize in the 20-ft. size. The company make the following prices for the export trade, the boats being boxed and l. o. b. New York: with Ferro motors, 16 ft., \$275; 18 ft., \$320; 20 ft., \$357.50; 22 ft., \$477.50; 24 ft., \$558.75; with Palmer motors, 16 ft., \$281; 18 ft., \$312; 20 ft., \$343.75; 22 ft., \$518.75; 24 ft., \$718.75. This concern has just placed upon the market a new model which they call the Sportsman's Fishing Boat. It is 16 ft. overall, and is also built from plans drawn by Gurney. The motor is housed in a cross-seat, yet is accessible for repairs. The forward seat is boxed up to form a well for keeping bait and fish alive. This boat is powered with a Palmer motor $3\frac{1}{4}$ in. bore by $3\frac{1}{2}$ in. stroke, or with a Ferro special $3\frac{1}{4}$ in. bore by $3\frac{1}{4}$ in. stroke, and sells with either motor l. o. b. Wareham, Mass., for \$225, with plain wheel and shaft, or \$250 with a Roper propeller.

The Gurnet Dory.

The Atlantic Co., Amesbury, Mass., are the builders of the unique type of motor known by the trade-mark name of Gurnet Dory, and popular both on the Great Lakes and along the entire Atlantic Coast, from Eastport to Key West. The Gurnet power dory is famous for its sea-going qualities, for its great steadiness and stability, for the proper trim of the boat at full speed, and for a refinement of finish equalling that of the finest pleasure boats afloat. The model is built in lengths from 16 to 30 $\frac{1}{2}$ ft., and is powered with engines from 3 to 15 h.p. The price of the 30 $\frac{1}{2}$ ft. type, including cork filled, leather substitute cushions, copper gasoline tanks and bronze deck fittings, with 10 h.p. Atlantic motor and reverse gear is \$950, with 15 h.p. motor \$1,050. Single spray hood, \$40 extra. Double spray hood, \$80 extra. In addition to the Gurnet Dory the Atlantic Co. build a semi-speed clipper motor boat, 25 $\frac{1}{2}$ to 30 $\frac{1}{2}$ ft. in length, attractively finished in either oak or mahogany, and in all particulars qualifying as a gentleman's pleasure boat and runabout.

Bluff City Line for 1912.

The 1912 stock model motor boats of the Bluff City Boat Co., Stillwater, Mich., are:

- 25-ft. runabout fitted with a 4-cycle, 4-cylinder, 12-h.p. Kermath motor, with complete automobile controls from bulkhead and finished in selected mahogany. Speed, 14 miles an hour. Price, \$900 f. o. b. Stillwater. Carrying capacity, 6.
- 18-ft. power canoe fitted with either a 5-h.p. Waterman motor or a 4-cylinder, 10-h.p. Waterman motor, with two cane cross seats and lazy backs and motor forward hood. Carrying capacity of four. Price for 5-h.p. outfit, \$310, and for the 10-h.p. outfit, \$385 f. o. b. Stillwater.
- 21-ft. runabout fitted with a double cylinder 6-h.p. Ferro motor, with engine forward under hood. Carrying capacity of six. Controls from the bulkhead. Price, \$450.
- 16-ft. canvas covered paddling canoe, finished in any color of enamel and spar varnish. Fitted with a keel at the bottom, removable foot grating on bottom, one paddle and wrapped in burlap ready for shipment, \$40 f. o. b. Stillwater.
- 16-ft. clear white cedar rowboat lap and stroke construction, furnished with one pair of oars and two pair of oar locks, \$34 f. o. b. Stillwater.

M. I. Doyle Company Builds Hand V-Bottoms.

The M. I. Doyle Company, boat builders, with offices and show room at 50 Church Street, New York, have arranged with designer Wm. H. Hand, Jr., to build the Hand V-bottom boat. This type of motor boat has become so popular that to meet the large and growing demand, the Doyle Company will put out five stock models with motors and equipment complete. The boats to be built consist of two distinct types, an open launch, and a covered deck or express runabout. The open boat will be built in two sizes, 18 ft. x 4 ft. 2 in. with 3 h.p. Stanley, speed 8 miles per hour, for \$275, and a 22 $\frac{1}{2}$ ft. x 4 ft. 11 in. size with a 7 h.p. Stanley, 11 miles per hour, for \$475. The covered deck or express runabout type will comprise a 22 ft. 6 in. auto express, a 28 ft. auto express, and a 30 ft. speed runabout. The prices for these boats are \$900 for the 22 ft. 6 in. size, \$1,200 for the 28 ft. boat, and \$800 for the 30 ft. speed runabout. All these boats are of clear white oak framing, white boat cedar planking, mahogany trim, copper fastening, and the decks are put in $\frac{1}{4}$ -inch strips, finished bright.

The Racine Line.

The Racine Boat Co., Racine, Wis., are designers and builders of all classes of motor boats, and carry a full line of stock models. The foreign office of this company is at 68 Broad Street, New York. The Racine line includes the following boats of various types and sizes: Open motor boats of 35 ft., 40 ft., 45 ft., 50 ft. and 60 ft. over all, left open or provided with canopy top or complete cabin, as desired, ranging in price from \$1,250 to \$6,150; raised deck cruisers in lengths of 35 ft., 43 ft., ranging in price from \$2,665 to \$5,670; a 40-ft. cabin cruiser with raised pilot house for \$2,870; day cruisers and glass cabin cruisers in prices from \$1,500 to \$2,875; a 25-ft. raised deck cruiser for \$1,000; open motor boats from 16 ft. to 30 ft. to price from \$225 to \$1,100, and with various types of stern; a 15-ft. special motor boat for \$170; a 19-ft. semi-speed for \$355; high speed boat in lengths of 26 ft., 30 ft. and 32 ft., and prices from \$740 to \$2,580; turbine motor boats, government boats, commercial boats, etc. The prices here quoted do not include salt water fittings, for which an extra cost of from \$23 to \$110 is required.



A Standard Knox Yawl Dory in Action.



23-ft. Breese Hydroplane.



The Cape Cod "Sportsman's Fishing Boat."



30-foot Atlantic Gurnet Dory in Marblehead Harbor.



Bluff City Runabout 35 ft. x 5 ft. 6 in.



A Racine Cruiser.



Rice 20-ft. Special.



The Robertson Speedy 28-ft. Runabout.



A 20-ft. Red Wing which makes 20 miles per hour.



A V-Bottomed Boat from the Bath Marine Construction Co.



Everett Hunter 25-ft. family boat.



Ginman 25-ft. Runabout.

The Rice 20-Footer.

Rice Bros. Co., East Boothbay, Me., after seventeen years experience in building boats and yachts of all sizes to order, have turned their entire plant and force into producing one type of stock motor boat, the most popular size of which is a 20-ft. launch, with 4 ft. 4 in. beam, making a safe and seaworthy boat, suitable for use in any waters in ordinary summer weather. By putting the business on a manufacturing basis, making the complete boat ready to use and including the motor, they are in a position to produce the complete outfit at about one-half the cost of building the same type of boat under the usual conditions. The benefit of all this is given to the purchaser. In the last year they have greatly increased their plant in order to meet the increasing demand for their 20-ft. special and 20-ft. fast runabout. The former complete with 4-h.p. motor, is sold for \$275, and the latter with a guaranteed speed of 12 miles an hour, for \$375. The workmanship on these boats is first class, and the material used is of the best quality, and all boats have salt water fittings.

Products of Robertson Bros.

Robertson Bros., Hamilton, Canada, designers and builders of speed and cruising motor boats, have two specials, a 23-ft. semi-speed runabout and a 20-ft. roomy family boat. The former is typical of the boats of this type which this company build in lengths of from 20 to 30 ft., and from 3 to 5 ft. beam. It is a moderately fast boat, but convenience has not been sacrificed to attain extreme speed. Twelve miles an hour or better may be expected with six people. Both the 23-ft. runabout and the 20-ft. family boat are sold in four ways—knock-down frames, rough planked hulls, semi-finished hulls, and complete outfits ready for gasoline. The Ferro engine is employed to a large extent. With the 8-h.p. type of Ferro and heavy-duty reverse gear, the 23-ft. boat sells for \$550; with an 11-h.p. Ferro, for \$615. The price of the Robertson family 20-ft. boat, equipped with 5½ h.p. Ferro, with reverse gear, is \$375. Without reverse gear it is \$337. These prices are for the complete hull, properly finished throughout. Prices for the hulls in various stages of completion may be obtained from the company. Robertson Bros. have shipped a number of boats of the semi-speed type in knock-down form to the Northwest provinces, and to points on the Pacific Coast. Several cruisers have also been recently shipped to the Pacific Coast and Winnipeg. The sizes most in demand are 35 and 40 ft. for the cruisers.

The Red Wing High Speed Runabout.

The Red Wing Motor Co., Red Wing, Minn., manufacturers of Red Wing motors and motor boats, announce a new 20-ft. high-speed runabout, which they pronounce the fastest two-cylinder boat in existence. It is a 20-ft. boat with 4½-ft. beam, and is equipped with two-cylinder, two-cycle, Red Wing high-speed motor, which has a 3 x 5 bore and stroke. The engine turns at 1,500 r.p.m., which drives the boat at better than 20 miles per hour. The framing of the boat is of white oak throughout. Planking and interior finish of decks is of white cedar. Coaming and covering board of white oak. The boat is one-man control, with motor forward under hood. The motor controls are at forward bulkhead. There is a cross seat in the stern. These boats are now placed upon the market at \$600.

Bath Marine Construction Company's Products.

The output of the Bath Marine Construction Co., Bath, Me., naval architects and yacht builders, includes a large number of different types of boats ranging from 10-ft. tenders to 30-ft. cruisers. The complete price list of each of the products of this concern is given below:

	20 Ft. Boats.	22 Ft. Hydro-Boats, plane, 18 Ft. Boats.	16 Ft. Boat.	10 Ft. Tender.
Plans, spec., instruc., etc.	30 Ft. 25 Ft. Cruiser \$12.50	22 Ft. 18 Ft. Runabout \$12.50	16 Ft. Boat \$5.00	10 Ft. Tender \$3.00
Complete full size patterns.	20.00	20.00	15.00	12.00
Knock-down frame	85.00	75.00	55.00	48.00
Hull in rough	185.00	165.00	130.00	90.00
Hull complete ready for engine	725.00	600.00	360.00	270.00
All material dressed to thickness, plans, etc.	85.00	65.00	50.00	45.00
Planking cut to shape and fitted	50.00	40.00	32.50	24.00
Coaming and covering board	10.00	8.00	8.00	7.00
Coaming and wash boards	7.00	6.00	6.00	5.00
Flooring	6.00	5.50	5.00	4.50
Ceiling	20.00	15.00	10.00	8.00
Cabin Roofing	8.00	7.00	6.00	5.00
Roof Beams	8.00	7.00	6.00	5.00
Oak or galvanized rudder	8.00	6.00	5.00	4.00
Galvanized fittings and fastenings and fittings	8.00	8.00	7.00	5.00
Br. Fastenings and fittings	23.00	20.00	12.00	11.00

The Bath Marine Construction Company make a specialty of knock-down, V-bottom boats.

Hunter Quality Launches.

The products of the Everett Hunter Boat Co., McHenry, Ill., include the following stock boats ready for delivery at all times: 16 ft. with 2 h. p. motor, 2 cycle, single cylinder, \$115; 18 ft. with 2 h. p. motor, 2 cycle single cylinder, \$135; 20 ft. with 4 h. p. motor, 2 cycle, single cylinder, \$250; 22 ft. with 6 h. p. motor, 2 cycle, single cylinder, \$300; 25 ft. with 6 h. p. motor, 2 cycle double cylinder, \$300; 30 ft. with 10 h. p. motor, 4 cycle, four cylinder, \$550; 35 ft. speed model, 20 h. p. motor, 4 cycle, \$600; 30 ft. speed model, 42 h. p. motor, 4 cycle, \$850. These prices are amended with "and up." The boats are complete, ready to run, but no extras are included. The manufacturers solicit a comparison of these prices with those of any company in this country, the quality of the work being taken into consideration. In 1912 the Everett Hunter Co. will have a line of stock hydroplanes in 19 and 25 ft. lengths. In addition to their stock line, they build to order in any style or size up to 50 ft. Perhaps their most popular model is a 25 ft. family launch. This is finished in oak or mahogany and has full auto control. It is equipped with either a standing or auto canopy, and is furnished with 2 ½ h. p. motor and reverse gear for \$390 and up. The motor is concealed under the hood and is installed in the cockpit ready to run. Cushions, brass railing and ice box are among the other things furnished.

Ginman 25-Footer Runabout.

The Ginman Boat Co., Muskegon, Mich., are manufacturers of a 25 ft. runabout stock boat, which they equip with any desired motor, and sell at varying prices, according to the motor used, the equipment and interior arrangements. This boat is also sold in knock-down frames. The boat has a beam of 5 ft. 4 in., a heavy frame, hollow bow and flat under-water body. Nearly all the ribs go in one piece from gunwale to gunwale, making a very stiff boat. The knock-down frame is erected ready to plank. It is then taken from the molds and may be shipped fully erected in two sections or knocked down. The Ginman Co., also manufacture an 18 ft. boat on the same lines as the 25 ft. and build other types of boats to order. The prices of the 25 and 18 ft. types, those for complete equipment including besides the knock-down frame, planking, material for covering boards, coaming and decking, as well as rudder chocks, etc., are as follows: Paper patterns, 25 ft., \$7.00; 18 ft., \$5.00; knock-down frame and patterns, 25 ft., \$40; 18 ft., \$30; complete equipment, 25 ft., \$85; 18 ft., \$70.

The Lindley Full Torpedo Semi-Speed Boat.

The W. H. Lindley Co., Canastota, N. Y., which is situated on the Erie Canal, regard their full torpedo model semi-speed boat built on the Ellis pattern as one of their most popular models. This boat is of special design, and has lines that recommend it to all lovers of safe and speedy boats. It is furnished with either locker seats or four chairs as desired. The motor is located forward of amidships. Following are the prices of this type of boat: 22 ft., with 2-cylinder, 8-h.p. Ferro, \$378; 22 ft., with 12-h.p. Ferro, \$461; 25 ft., with 8-h.p., 2-cylinder Ferro, \$500; 25 ft., with 3-cylinder, 12-h.p. Ferro, \$585. The Lindley special speed boat, which gives with a 3-cylinder, 12-h.p. Ferro, a speed of 16 to 17 miles per hour, is 25 ft. long, and sells for \$600. The same boat with a 3-cylinder, 35-h.p. engine, attains a speed of 20 to 21 miles an hour, and sells for \$750. The Lindley special family boat, 20 ft. long, 5 ft. beam, will seat eight people, and with a 2-cylinder, 6-h.p. Lindley special engine, has a speed of about 8 to 9 miles an hour. The price of this boat is \$300. The Lindley people also manufacture the "Deep Water Fisherman" for \$295; a semi-torpedo model pleasure boat, and a 22-ft. semi-torpedo model pleasure boat.

The Mullins Line for 1912.

For 1912 the W. H. Mullins Co., Salem, Ohio, will continue their line of Special and Leader launches and automobile boats, which proved so popular this season. They have worked out some very nice improvements in the boats which will make them a more attractive proposition than ever before and still further enhance the world wide reputation and popularity attained by these well-known steel boats.

The Mullins Co. will also have a line of high-grade cedar canvas covered canoes on the market for 1912. With their wide experience and excellent facilities, an extensive business on this popular craft can be safely predicted and the Mullins canoe will undoubtedly find a warm spot in the hearts of the boating enthusiasts.

Condensed specifications of Mullins motor boats for the coming season, with prices, are as follows: 26-ft. Automobile boat, powered with Lowe Victor 30-h.p., 4-cycle, 4-cylinder engine, cast in bloc; speed, 16 miles per hour; price, \$1,375. 20-ft. Automobile Boat, with Ferro 8-h.p., double cylinder; speed, 11 miles; price, \$500. 24-ft. Leader, with Ferro 8-h.p., double cylinder; speed, 11 miles; price, \$525. 20-ft. Leader, with Ferro 11-h.p., double cylinder; speed, 12 miles; price, \$625. 18-ft. Leader, with Ferro 6-h.p., double cylinder; speed, 10 miles; price, \$275. 18-ft. Special, with Ferro 6-h.p., double cylinder; speed, 9 to 10 miles; price, \$225. 18-ft. Special, with Ferro 3-h.p., single cylinder; speed, 7 miles; price, \$190. 16-ft. Special, with Ferro 3-h.p., single cylinder; speed, 9 miles; price, \$130.

A full line of row boats, duck boats and canoes. Send for their handsome Book of Boats, giving full details.

Gentlemen's Auto Craft Runabout.

The Cleveland Auto Boat Mfg. Co., Cleveland, O., makers of the well-known Auto Craft launches, have in their 25-ft. mahogany runabout a particularly attractive model which is a favorite and a big seller. This boat is the result of a careful study for producing a type which will combine speed, seaworthiness and convenience, comfort and luxury. The hull has an exceptional depth of freeboard with pronounced flare, which prevents spray from flying over the boat, and makes her an extremely dry craft. The frame is of well-seasoned select oak, the ribs of rock elm, the deck clamps of hard pine, carlins of hard maple, floor timbers and flooring of pine, planking of Southern cypress, and ceiling, coaming, decking covering boards, bulkheads and seats of mahogany. The power is an 11-h.p., 2-cylinder, 2-cycle 1911 model Ferro, with reverse gear, rear starting device and electrical equipment, giving a speed of 13 miles per hour. The price complete is \$775, f. o. b. Cleveland. Regular Auto Craft boats are made and sold as follows: 24 ft., with 8-h.p., 2-cylinder Ferro, \$450; 21½ ft., 4-h.p., single-cylinder Ferro, \$300; 18 ft., 3-h.p. Ferro, \$200. The company also construct cabin boats and cruisers, and Auto Craft tenders, "afternoon" launches and commercial craft, for which prices will be furnished upon application.

The 1000 Island Specialty.

The Thousand Island Boat & Engine Co., Morristown, N. Y., manufacturers of marine and stationary gasoline engines, cruisers, speed boats and pleasure boats, build boats of all classes and designs from 18 ft. up to 60 ft. All of these are propelled by gasoline motors. Boats built by this company are made of mahogany or any other wood designed. A specialty, however, is made of a boat 28 ft. long by 5 ft. beam, with oak keel stem, ribs, etc., cypress keelsons, pine hull, gunwales and decks of stripped mahogany. These are equipped with one of the company's 15 H. P. motors, which is placed forward under hatches. These boats have a complete bulkhead control and are handled the same as an automobile from the driver's seat. Behind the bulkhead is a steering seat and a cockpit 7 ft. 2 in. long. This boat is equipped with a McClellan automobile top, and all trimmings are brass. A number of ventilators are furnished, as well as lamps. Atwater-Kent horn and cushions for two seats. The price of this boat is \$1,450 complete.

The Lexington 18-Foot Model.

To the first twenty-five persons sending in their order, the Lexington Boat Co., Lexington, Ky., will sell for \$175 complete, their 18-ft. raking transom stern launch, complete with 3-h.p. Ferro, reverse gear and entire equipment. This is a stylish little runabout, designed to meet all the requirements of the man who wants a boat of medium price that will develop a fair speed, and prove satisfactory in every way. The length of cockpit is 12½ ft., seating capacity eight persons, and the speed 7 to 8 miles per hour. Other Lexington boats include a 20-ft. compromise stern launch, with 4-h.p. Ferro, at \$325; a 23-ft. raking transom launch, with 8-h.p., 2-cylinder Ferro, for \$425; a 25-ft. raking transom stern launch, with 11-h.p., 2-cylinder Ferro, for \$500, or with 15-h.p., for \$535; and a 25-ft. fan-tail stern launch, with 8-h.p., 2-cylinder Ferro, for \$525, or with 11-h.p., \$550. Raised deck cabin cruisers are built to order only and specifications and prices will be furnished upon application.

The Ripley Steel and Light Draft Motor Boats.

In order to supply the fast going demand for all steel hull motor boats of very light draft, the Ripley Steel Boat Co., Grafton, Ill., recently moved to a large new factory equipped with modern machinery and with tracks leading to the river for the purpose of permitting the testing of their boats in the Mississippi River before shipment. One of the steel boats manufactured by this concern is 34 ft. long by 6 ft. beam, 16 in. draft. She is built of No. 14 galvanized steel plates and the hull is of Ripley semi-tunnel type. The power plant is a 25-h.p. Ferro. The Ripley people build a large line of all styles and kinds of motor craft, also knockdown steel motor boats, bunks, cruisers, barges, houseboats, ferries, row boats, tenders, etc. They will build boats to order at any size up to 75 ft., using various weights of galvanized steel plates. The company have been furnishing the United States Government with boats for the last five years and a great many of the Ripley all-steel boats are now in foreign waters.

J. H. Ross Boat and Canoe Company.

The J. H. Ross Boat & Canoe Co., Orillia, Ontario, builders of hunting, fishing, sailing and surveying canoes, motor boats, skiffs and dinghies, call their 30 ft. by 5 ft. 6 in. motor boat their most characteristic model. This boat is equipped with a 25-h.p. Buffalo auto-marine engine, which is installed under a mahogany hood forward and drives the boat at the rate of 20 miles an hour. Other products of the Ross Co. are a 30 ft. canopied motor boat with a seating capacity of 34 persons, arranged for one-man control; a 26-ft. torpedo stern motor boat (also made in other lengths from 25 ft. to 30 ft.), with a pronounced flare of the forward section and of a generally racy appearance. Stability and strength have been given careful consideration. Another stock boat of this company is a 23-ft. runabout having a bulkhead seat just after the engine, which is placed well forward in the cockpit and to which all controls are run. They also build a 30 ft. trunk cabin cruiser with an 8 ft. 6 in. beam and a 2 ft. draft, and a 21 ft. motor boat, built with either a V-shape or transom stern with interior arranged for side lockers or chairs, as preferred. Any standard motor the customer may select will be installed.



Lindley Special Speed Boat.



A 26-ft. Mullins Automobile Boat.



A Stock Auto Craft of the Cleveland Auto Boat Manufacturing Company.



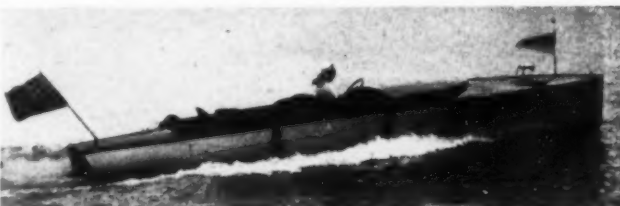
From the Yard of the 1000 Island Boat and Engine Company.



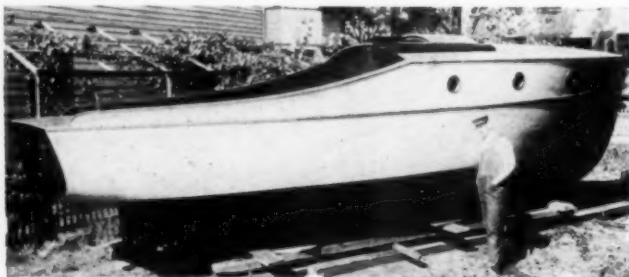
A Lexington Runabout.



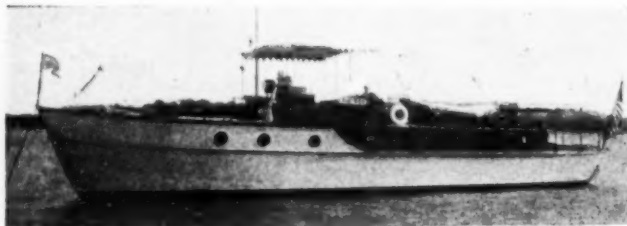
A Ripley All-Steel Semi-Tunnel Hull Motor Boat.



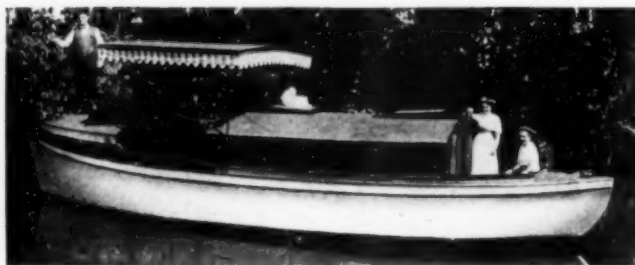
A Ross Twenty-Mile Thirty-Footer.



A Tarrytown Boat Works Thirty-Footer.



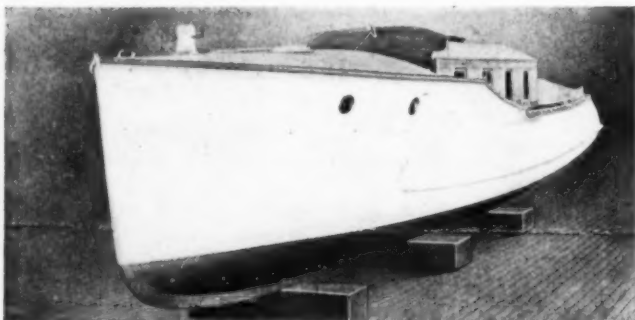
A Racine (Muskegon) Cruiser. . .



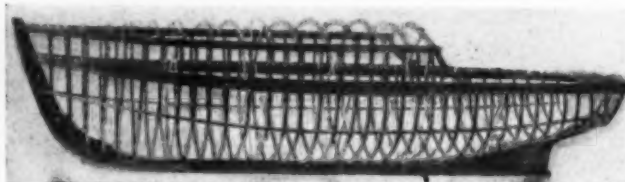
A Defoe \$1800 Thirty-six Foot Cruiser.



The Richardson 28 ft. 8 in. by 7 ft. 4 in. Cruiser.



Bronze Cruiser Built by the Welin Davit, Lane & De Groot Co.



A Monitor Knock-Down Frame (Assembled).

The Tarrytown Boat Works Cruiser.

A specialty of the Tarrytown Boat Works, Tarrytown, N. Y., is a 30 ft. by 8½ ft. raised-deck cabin day cruiser. This boat was designed by the company as a speedy cruiser with construction sufficiently heavy to permit outside trips. The lines presented are pleasing and symmetrical. The sheer line shows a medium flare forward and at the cockpit breaks into a long easy curve resting on the after deck. As is usual with the quality of construction of this firm, the details are carried out to meet the requirements of the best architect's specifications. The stern is of the Norman V type, wide enough to accommodate a generous seat after the cockpit. The gasoline pipe connections are fitted to meet the latest requirements of Lloyds. The interior of the cabin is finished complete in solid paneled mahogany. The cabin has 6 ft. 2 in. head room. The cockpit is covered with standing roof and side curtains. It is 11 ft. long and will easily accommodate twelve people without crowding. The boat will run 10 miles per hour with a 15-h.p. motor and 12 with a 25-h.p. motor.

Stock Boats of the Valley Boat and Engine Company.

The Valley Boat and Engine Company, Saginaw, Mich., are designers and builders of power boats completed or knocked down and are the constructors of the celebrated "Faultless" frames. They are about to place in the market a line of four stock boats. One is a sixteen footer with 4 ft. 6 in. beam of the runabout type. This boat has a very pronounced flare forward with exceptional freeboard of 2 ft. 6 in. forward and seats eight or nine comfortably. Because of the flare and great depth of this model she is an exceptionally dry boat. A 3 to 4 H. P. Faultless motor, two-cycle type, is the power. This company also have an 18 ft. by 4 ft. 8 in. model built on the same lines as the 16 ft., and a 20 ft. model of the same design, but with the bulkhead directly after the engine. These two boats will be sold at popular prices. The Valley Boat and Engine Company will also specialize on a stock cruiser 25 ft. 8 in. by 8 ft. 6 in. and furnishes comfortable accommodation for four people.

The DeFoe \$1800 Cruiser.

The DeFoe Boat & Motor Works, Bay City, Mich., are designers and builders of complete boats of all classes for business or pleasure. They also furnish boat patterns and knock-down frames for the amateur builder. They have two stock models of finished and equipped boats, namely an 18-ft. 3-h.p. launch, sold for \$130, and a 36-ft. \$1,800 cruiser. The latter has a beam of 9 ft. 6 in. and a draft of 2 ft. 4 in. The boat is in every sense a deep-sea cruiser, the construction of hull being heavy and staunch throughout. There are two cabins, the forward one being of the raised-deck type, while the after one is a trunk type, low and protected by a 6-in. plankhead and 3-in. fender. There are also two cockpits, the after one of which is self-bailing. The motor is located in a portion of the boat where it is entirely out of the way, yet readily accessible whenever necessary. All controls from the motor are brought to the bridge deck. There is no more reason for watching the motor or giving it the constant attention of an engineer, than there is need for an engineer on an automobile. The cabin arrangement of this boat furnishes berths and cruising accommodations for six persons, while two more may be accommodated in temporary berths on bridge deck under canopy, which is arranged with heavy storm curtains. The best of equipment has been used throughout. The electric light system is the Dayton outfit, consisting of dynamos, switchboard and Hubbler-Dayton storage batteries of 12 volt 85 ampere hour capacity. The 18-ft. special launch manufactured by the DeFoe Co. and sold for \$130 has carrying capacity of eight people and a speed of about nine miles per hour. It is an exceptionally steady boat on the water and is safe and dry under conditions that would puzzle many a larger craft.

Richardson Stock Designs.

G. R. Richardson, North Tonawanda, N. Y., carries a line of stock designs from 8-ft. dinghies to 45-ft. cruisers. Using these designs as a basis, he builds to order only. If the stock design does not meet the exact requirements, Mr. Richardson sometimes changes it slightly, or else gets up an entirely new design. He will also build from designs furnished by the customer. In the finished boats, any engine which the customer desires may be installed. It may be furnished by the customer or sold to him by the builder. Mr. Richardson specializes in small cruisers, of which his 28 ft. 8 in. by 7 ft. 4 in. has proven the most popular model. It is extremely seaworthy, having good deadrise, and is easily driven, making about 9½ miles an hour with a 12-h.p. medium-duty engine. The boat has a V-transom stern, leaning aft. The complete hull ready for power in this size costs \$600. It is also furnished in various stages as follows: Knock-down frame, \$80; with planking cut to shape, \$120; hull in rough, \$180; hull planed, caulked and sanded, \$200. Prices for the other stock boats may be had upon application. They are made in the following sizes and types: 18 ft. vertical transom runabout, 20 ft. vertical transom runabout, 22 ft. V-bottom runabout, 25 ft. V-transom raking aft, 30 ft. vertical V-transom runabout. Family boats from 20 ft. to 30 ft. with compromise or V-transom raking aft stern. Cruisers: 25 ft. 5 in., 26 ft., 30 ft. by 6 ft. 6 in., 30 ft. by 8 ft., and 35 ft. by 9 ft., with compromise or V-transom sterns.

25-Foot Bronze Runabout Hull.

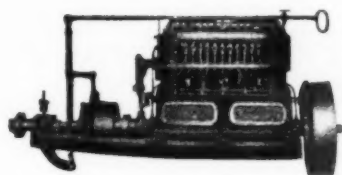
The Welin Davit and Lane & De Groot Co., 17 Battery Place, New York City, are now making a specialty of motor boats of bronze construction. These are made up according to customers' specifications and requirements, and is such that it will undoubtedly appeal particularly to the export trade of this concern. A popular size of this type of launch is a 25-ft. runabout, the beam of which is 4 ft. 6 in., and the draft exclusive of keel, 9 in. The plating of the boat is Parsons manganese bronze. The keel and frames, however, are of oak, as are also the stem and stern post. The Svard patent clip construction is employed. The plating is worked in fairly wide strokes, double riveted with rivets of the same material, 20 rivets to the foot, with felt between the laps to insure absolute tightness. The shell plating proper is fastened with brass screws. To stiffen this plating, light but very closely spaced oak, steam-bent frames, are worked in after the shell-plating has been entirely riveted and attached to the latter with U-shaped bronze clips. These clips are riveted to the shell direct, metal to metal, and no fastenings pass through the frames, thus obviating all danger of splitting the latter and the working loose of fastenings so apt to occur when metal and wood are direct fastened, owing to the difference in expansion of the two materials. The same company also build a 36-ft. bronze cruiser of the same construction, which, with a 35 to 40-h.p. 6-cylinder Holmes motor, gives the boat a speed of 14 miles per hour.

Monitor Knock-Down Frames.

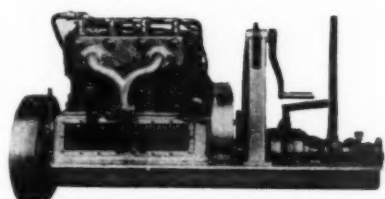
The Monitor Boat & Engine Co., builders of Monitor knock-down boat frames, with the Gere method of easy boat building, have given special attention to a simplified planking system. This method enables them to furnish frames on any beam to a given length, thus not confining themselves to a few certain set sizes, which cannot be varied when the so-called paper pattern system of planking is used. The product of this company consists principally of fully fitted frames; that is, frames which have been erected in the shop, and all ribs fitted into place properly before being knocked down for shipment, and requiring only the re-creation by the purchaser to make ready for planking. The Monitor system of knockdown boat construction entirely eliminates the necessity of paper patterns for any part of the boat. Full instructions are furnished for doing the work and hundreds of creditable boats are now in use, built on Monitor knock-down frames. Monitor shipments are constantly increasing, and many have been made to Mexico, New Zealand and various points in the Far East. The boats for which knock-down frames are furnished range from the 16 ft. shallop model for \$30 to 30 ft. cruisers and cruising houseboats, as well as 50 ft. sight-seeing boats and large working boats.

AMERICAN MARINE MOTORS.

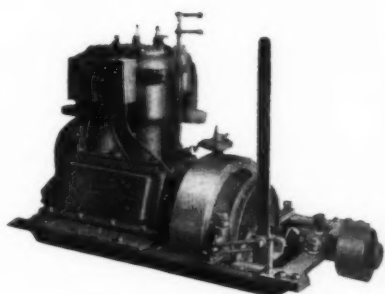
Tabular Specifications of the Product of the Principal Manufacturers of Marine Motors and Illustrations of Representative Models of the Various Makes.



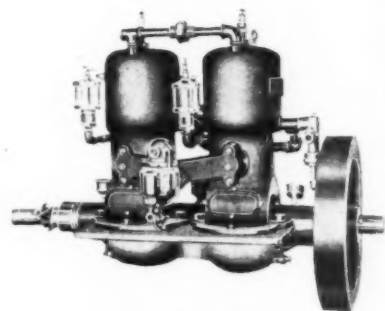
Alexander & Cox.



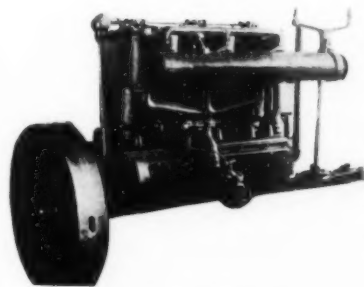
The Atlantic-Chester.



14-H. P. "Capitol."



10-H.P. Bay State.



A heavy duty Bevier.

Alexander & Cox.

ALEXANDER & COX COMPANY, CHICAGO, ILL.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
1	1½	600	2	1	3½ x 3
2	3	600	2	2	3½ x 3
3	5	600	2	3	3½ x 3
4	7	600	2	4	3½ x 3
Sportsmans' Friend	3	600	4	1	4 x 5
Sportsmans' Friend 2	6	600	4	2	4 x 5
Model 7	12	600	4	4	4 x 5
8	18	600	4	6	4 x 5
9	12	600	4	2	5½ x 6
10	24	600	4	4	5½ x 6

Alpha.

ALPHA MOTOR & FOUNDRY CO., DETROIT, MICH.

Model	G	h.p.	r.p.m.	cycle	cyl.	Inches.
G	12-15	1000	4	2	4	4 x 6
G	25-30	1000	4	4	4	4 x 6
G	40-45	1000	4	6	4	4 x 6
D	3-4	800	2	1	3½	3½ x 4
D	8-10	800	2	2	3½	3½ x 4

Anderson.

ANDERSON ENGINE CO., SHELBYVILLE, ILL.

No.	h.p.	r.p.m.	cycle	cyl.	Inches.
4	2½	500	4	1	4 x 4
5	4	600	4	2	4 x 5
7½	7½	600	4	3	4 x 4
10	10	600	4	4	4 x 5
12	12	450	4	2	5 x 6
18	18	450	4	3	5 x 6
24	24	450	4	4	5 x 6
25	25	425	4	2	7 x 8
37½	37½	425	4	3	7 x 8
50A	50	425	4	4	7 x 8
50B	50	400	4	3	9½ x 11
75	75	400	4	4	9½ x 11
100	100	400	4	4	9½ x 11
150	150	400	4	6	9½ x 11

Arrow.

ARROW ENGINE WORKS, DETROIT, MICH.

Arrow	h.p.	r.p.m.	cycle	cyl.	Inches.
1½	850	2	1	3 x 2½	

Uses gasoline or kerosene.

Atlantic-Atlantic Special.

THE ATLANTIC CO., AMESBURY, MASS.

Atlantic	h.p.	r.p.m.	cycle	cyl.	Inches.
6	3	600	2	1	3½ x 3½
8	4	600	2	2	3½ x 3½
12	8	600	2	3	4½ x 4
12	12	600	2	4	4½ x 4
Special	5	600	2	1	4½ x 4½
15	15	600	2	3	4½ x 4½
Chester	20	1000	4	4	3 9/16 x 4 3/4
30	30	1000	4	4	4½ x 4½

Capitol.

AUTO ENGINE WORKS, ST. PAUL, MINN.

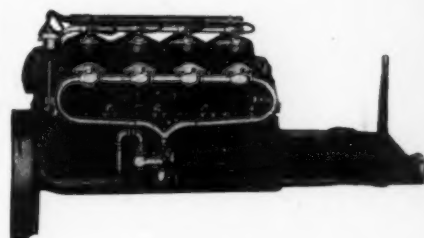
No.	h.p.	r.p.m.	cycle	cyl.	Inches.
14	5-6	175-1000	4	1	4½ x 5½
5	10	175-1000	4	2	4½ x 5½
6	20	175-1000	4	4	4½ x 5½
7	14	175-700	4	2	5¼ x 6
8	35	175-1000	4	4	5¼ x 6
11	600	200-1050	4	4	6½ x 7
12	100	200-1050	4	6	6½ x 7

Automatic.

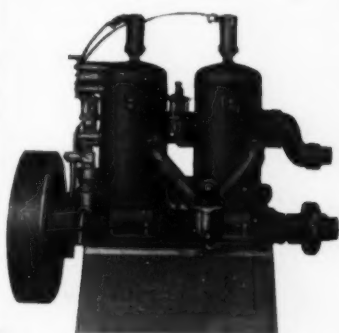
AUTOMATIC MACHINE CO., BRIDGEPORT, CONN.

Snapper	h.p.	r.p.m.	cycle	cyl.	Inches.
5	3	500	2	1	4½ x 4
7	5	500	2	1	5½ x 5
7	7	500	2	1	6½ x 6½
Launch	6	450	4	1	5½ x 7
12	12	450	4	2	5½ x 7
18	18	450	4	3	5½ x 7
24	24	450	4	4	5½ x 7
36	36	450	4	6	5½ x 7
Heavy Duty	12½	400	4	1	7½ x 9
25	25	400	4	2	7½ x 9
37½	37½	400	4	3	7½ x 9
50	50	400	4	4	7½ x 9
50	50	300	4	2	10 x 14
Yacht	75	400	4	3	7½ x 9
Heavy Duty	100	300	4	4	10 x 14
150	150	275	4	6	10 x 15
250	250	250	4	6	13½ x 18

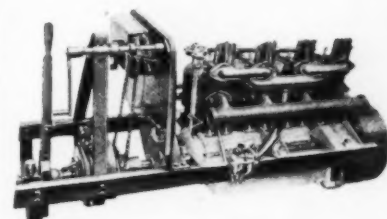
Note: The last seven motors run on producer gas, distillate or gasoline.



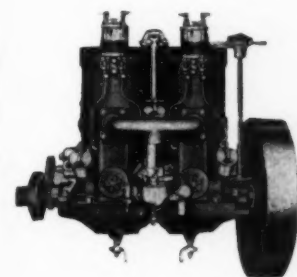
25-35 H.P. Blount & Lovell.



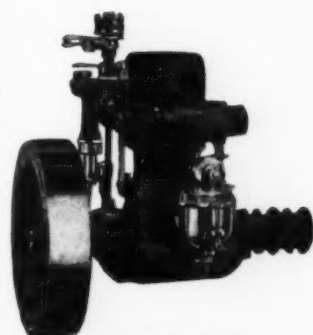
10-12 H. P. Atlantic "Special."



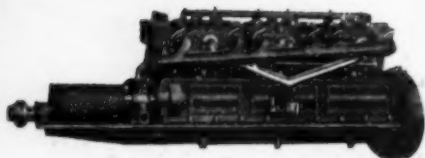
30-34 H. P. Brennan.



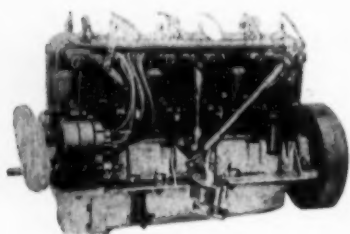
8-H.P. Brown-Talbot.



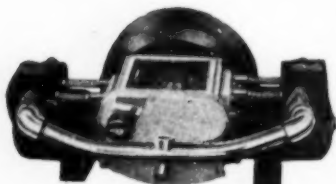
5-H.P. "Imperial."



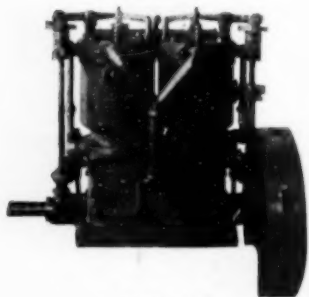
90-H.P. high-speed Buffalo.



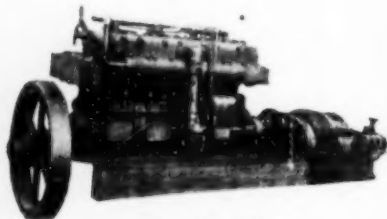
24-H.P., 6-cylinder Cameron.



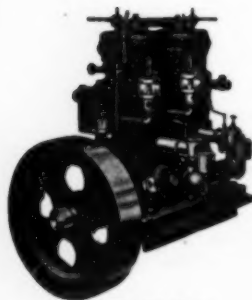
Brennan horizontal opposed.



20-H.P. Clay.



30-H.P. Clifton.



10-H.P. Cooley.

Bay State.

BAY STATE MOTOR WORKS, HOLYOKE, MASS.

	h.p.	cycle	cyl.	Inches.
1	2-3	2	1	3 1/2 x 3 1/2
2	5	2	1	4 1/2 x 4
3	5-6	2	1	3 1/2 x 3 1/2
4	7-8	2	1	5 x 5 1/2
5	10	2	2	4 1/2 x 4
6	15	2	3	4 1/2 x 4
7	15	2	2	5 x 5 1/2
8	20	2	4	4 1/2 x 4

Beaver.

BEAVER MFG. CO., MILWAUKEE, WIS.

	h.p.	r.p.m.	cycle	cyl.	Inches.
XL	40	1000	4	4	4 1/2 x 4 1/2
FL	50-60	1000	4	6	4 1/2 x 5 1/2

Beilfuss.

BEILFUSS MOTOR CO., LANSING, MICH.

	h.p.	r.p.m.	cycle	cyl.	Inches.
1	7 1/2	800-1000	4	2	4 1/2 x 4 1/2
2	10-12	800-1000	4	2	5 x 5
3	20	1000	4	4	4 x 4 1/2

Bevier.

BEVIER GAS ENGINE CO., KALAMAZOO, MICH.

	h.p.	r.p.m.	cycle	cyl.	Inches.
1	20	350	4	2	7 1/2 x 9
2	30	350	4	3	7 1/2 x 9
3	40	350	4	4	7 1/2 x 9
4	50	300	4	3	9 1/2 x 11
5	75	300	4	4	9 1/2 x 11
6	100	275	4	3	12 1/4 x 14
7	150	275	4	4	12 1/4 x 14

Engines of over 150 h.p. made on special order.

Bicknell.

BICKNELL MFG. & SUPPLY CO., JANESVILLE, WIS.

	h.p.	r.p.m.	cycle	cyl.	Inches.
Bicknell	10	700-800	2	2	4 x 5

B. & L.

BLUNT & LOWELL, BOSTON, MASS.

	h.p.	r.p.m.	cycle	cyl.	Inches.
F	10-17	425-600	4	2	5 1/2 x 6 1/2
E	18-25	425-600	4	3	5 1/2 x 6 1/2
E	25-35	425-600	4	4	5 1/2 x 6 1/2
E	36-50	425-600	4	6	5 1/2 x 6 1/2

Brennan.

BRENNAN MOTOR CO., SYRACUSE, N. Y.

	h.p.	r.p.m.	cycle	cyl.	Inches.
B	25-30	600-800	4	4	4 1/2 x 5
B	18-22	600-800	4	4	4 x 5
11	30-35	600-800	4	4	5 x 5
12	40-45	600-800	4	4	5 1/2 x 6
12	55-60	600-800	4	4	6 x 6
7	16-20	600-800	4	2	5 1/2 x 5
7	12-16	600-800	4	2	5 x 5
7	10-12	600-800	4	2	4 9/16 x 5

Bridgeport.

BRIDGEPORT MOTOR CO., BRIDGEPORT, CONN.

	h.p.	r.p.m.	cycle	cyl.	Inches.
30	3-4	500	2	1	3 1/2 x 4
40	4-5	500	2	1	4 1/2 x 5
50	5-6	500	2	1	5 1/2 x 5
70	7-8	500	2	1	5 1/2 x 5 1/2
90	9-10	400	2	1	6 1/2 x 6 1/2
60	6-8	500	2	2	3 1/2 x 4
80	8-10	500	2	2	4 1/2 x 5
100	10-12	500	2	2	5 1/2 x 5
140	14-16	500	2	2	5 1/2 x 5 1/2
180	18-20	400	2	2	6 1/2 x 6 1/2
270	27-32	400	2	3	6 1/2 x 6 1/2
17	10-12	500-700	2	2	4 1/2 x 5
E	15-20	500-700	2	3	4 1/2 x 5

These engines run on gasoline or kerosene.

Brownell.

F. A. BROWNELL MOTOR CO., ROCHESTER, N. Y.

	h.p.	r.p.m.	cycle	cyl.	Inches.
F-4	55	900	4	4	5 1/2 x 6 1/2
F-6	75	900	4	6	5 1/2 x 6 1/2

Brown-Talbot.

BROWN-TALBOT MACHINERY CO., SALEM, MASS.

Model.	h.p.	r.p.m.	cycle	cyl.	Inches.
1	4	600	2	1	4 x 4
2	7	500	2	1	5 1/2 x 5
3	10	400	2	1	7 x 6 1/4
4	8	600	2	2	4 x 4
5	14	500	2	2	5 1/2 x 5
6	20	400	2	2	7 x 6 1/4

Brooks.

BROOKS MFG. CO., SAGINAW, MICH.

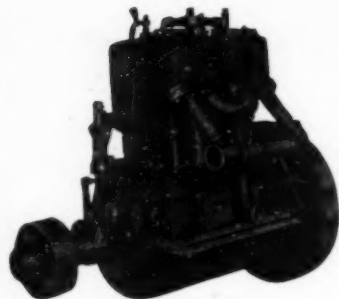
	h.p.	r.p.m.	cycle	cyl.	Inches.
234	8	50-1000	2	2	3 1/2 x 3 1/2

Imperial.

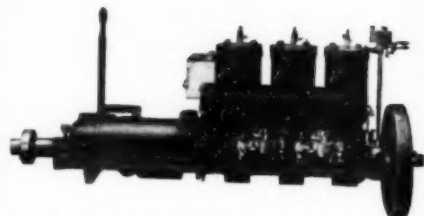
BRUCE, STEWARD & CO., LTD., CHARLOTTETOWN, PRINCE

EDW. ISLAND.

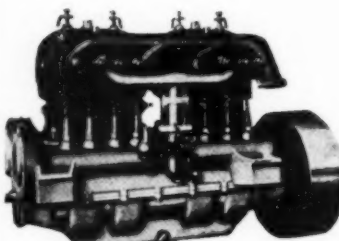
	h.p.	r.p.m.	cycle	cyl.	Inches.
A	5	500	2	1	4 1/2 x 4



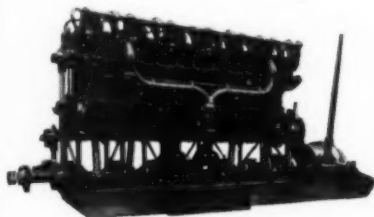
12-H.P. Comet.



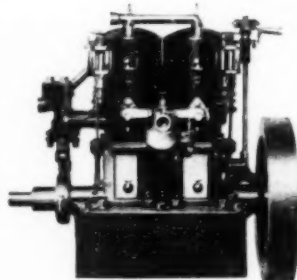
Defoe Three-Cylinder Motor.



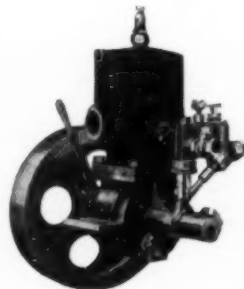
Continental, Type J.



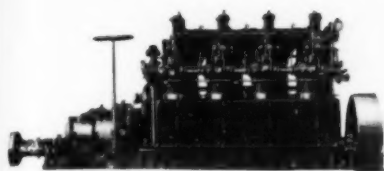
James Craig, 300-H.P.



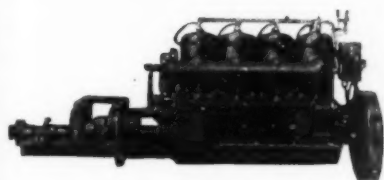
A Detroit model.



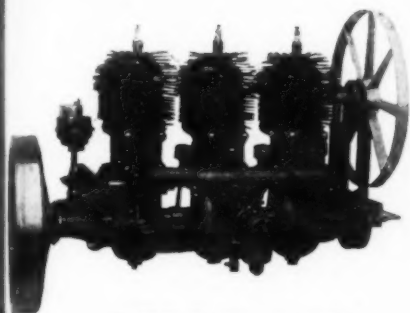
1 1/2-H.P. "Liberty."



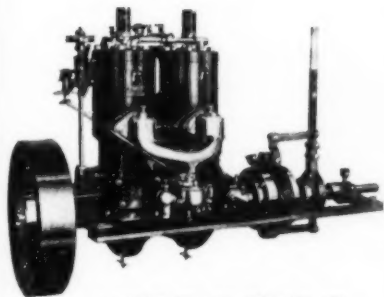
100-H.P. Doak.



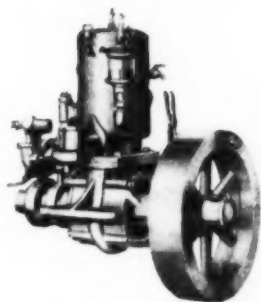
A 1912 Doman model.



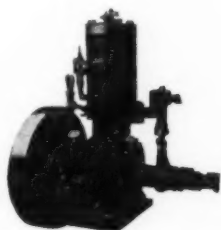
20-H.P. Duryea air-cooled.



15-H.P. Eagle, Model 2E.



3-H.P. Eclipse.



3 1/2-H.P. Economic.

Buffalo Marine Engine.

BUFFALO GASOLINE MOTOR CO., BUFFALO, N. Y.

Regular Type	3 h.p.	700 r.p.m.	4 cycle	2 cyl.	Inches.
"	5	600	"	2	3 1/2 x 4
"	7 1/2	600	"	2	3 1/2 x 5
"	10	600	"	2	3 1/2 x 5 1/2
"	15	600	"	4	3 1/2 x 4 1/2
"	20	500	"	4	4 1/2 x 5
"	65	375	"	4	5 x 6
"	100	375	"	4	8 1/2 x 9
Auto Marine	25	800	"	4	8 1/2 x 9
"	40	800	"	4	4 1/2 x 5
High Speed	90	900	"	6	4 1/2 x 5 1/2
"	60	900	"	6	6 1/2 x 6 1/2
Heavy Duty	12	350	"	2	6 x 7 1/2
"	18	350	"	2	7 x 9
"	24	350	"	4	6 x 7 1/2
"	36	350	"	4	7 x 9
"	54	350	"	6	7 x 9
"	9	350	"	2	5 x 6 1/2
"	85	300	"	4	10 x 12
"	125	300	"	4	10 x 12

*New Models. All engines above 5 h.p. will be equipped with kerosene device if desired without extra cost.

Cady of Canastota.

THE C. N. CADY CO., CANASTOTA, N. Y.

Cady	3 h.p.	700 r.p.m.	2 cycle	1 cyl.	Inches.
"	4	700	"	1	3 1/2 x 3 1/2
"	6	700	"	2	4 1/2 x 4
"	8	700	"	2	3 1/2 x 3 1/2
"	12	700	"	2	4 1/2 x 4
"	20	700	"	3	4 1/2 x 4
"	30	700	"	3	5 1/2 x 5
"	40	700	"	4	5 1/2 x 5

Perfection.

THE CAILE PERFECTION MOTOR CO., DETROIT, MICH.

B	2 h.p.	100-800 r.p.m.	2 cycle	1 cyl.	Inches.
B	2 1/2	100-800	"	1	3 1/2 x 3 1/2
B	3 1/2	100-800	"	1	3 1/2 x 4 1/2
B	6	100-800	"	2	4 1/2 x 4 1/2
Heavy Duty	8	100-600	"	2	5 1/2 x 5
Fisherman's	8	100-600	"	2	5 1/2 x 5
Heavy Duty	8	100-600	"	2	5 1/2 x 5
"	7-8	100-1000	"	2	3 1/2 x 3 1/2
"	12	100-1000	"	3	3 1/2 x 3 1/2
"	14	100-800	"	2	4 1/2 x 4 1/2
"	18-20	100-650	"	2	5 1/2 x 5
"	30	100-1000	"	2	4 1/2 x 4 1/2

Knox.

CAMDEN ANCHOR-ROCKLAND MACHINE CO., CAMDEN, ME.

	3 h.p.	600 r.p.m.	2 cycle	1 cyl.	Inches.
1	3	550	"	1	4 x 4
2	4 1/2	550	"	1	4 1/2 x 4 1/2
3	5 1/2	550	"	1	5 x 5 1/2
4	7 1/2	500	"	1	5 1/2 x 6 1/2
5	9	600	"	2	4 1/2 x 4 1/2
6	11	550	"	2	5 x 5 1/2
7	15	500	"	2	5 1/2 x 6 1/2
8	16	525	"	3	5 x 5 1/2
9	22	500	"	3	5 1/2 x 6 1/2
10	30	500	"	4	5 1/2 x 6 1/2
11	20	450	"	2	7 x 8
12	40	450	"	4	7 x 8

Equipped to run on gasoline, kerosene, distillate and alcohol.

Cameron.

CAMERON CAR CO., BEVERLY, MASS.

Cameron	16 h.p.	1000 r.p.m.	4 cycle	4 cyl.	Inches.
"	24	1000	"	6	3 1/2 x 3 1/2
"			"	6	3 1/2 x 3 1/2

Campbell.

CAMPBELL MOTOR CO., WAYZATA, MINN.

2500	100-125 h.p.	1000-1200 r.p.m.	4 cycle	6 cyl.	Inches.
					6 1/2 x 6 1/2

Clay.

E. H. CLAY & CO., CLEVELAND, OHIO.

	6 h.p.	500 r.p.m.	4 cycle	1 cyl.	Inches.
1	6	500	"	1	5 1/2 x 6 1/2
2	8	500	"	1	6 1/2 x 7
3	10	500	"	1	7 1/2 x 7 1/2
4	12	500	"	2	5 1/2 x 6 1/2
5	14	500	"	2	6 1/2 x 7
6	20	500	"	2	7 1/2 x 7 1/2

Clifton.

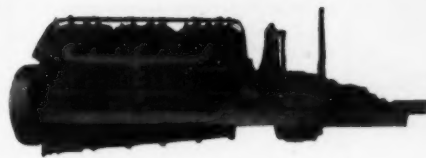
CLIFTON MOTOR WORKS, CINCINNATI, OHIO.

Clifton	30 h.p.	450 r.p.m.	4 cycle	4 cyl.	Inches.
1	10	100-800	"	2	6 1/2 x 7
2	15	100-800	"	3	5 x 6
3	20	100-800	"	4	5 x 6
4	14	125-600	"	2	6 1/2 x 7
5	21	100-600	"	3	6 x 7
6	28	100-600	"	4	6 1/2 x 7
7	60	75-600	"	6	6 1/2 x 7
8	65	75-500	"	3	8 1/2 x 11

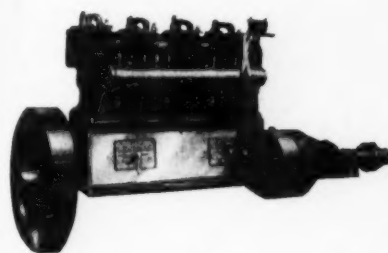
Comet.

COMET MOTOR WORKS, CHICAGO, ILL.

Vertical.	8 h.p.	600-700 r.p.m.	4 cycle	2 cyl.	Inches.
Marine	16	600	"	4	4 1/2 x 5
"	12	550	"	4	4 1/2 x 5
"	24	550	"	4	5 1/2 x 6
"			"		3 1/2 x 6



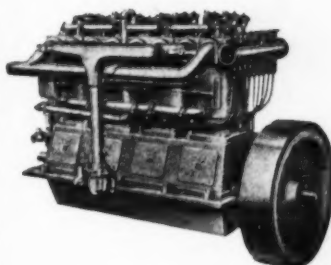
The 60-H.P. Elco.



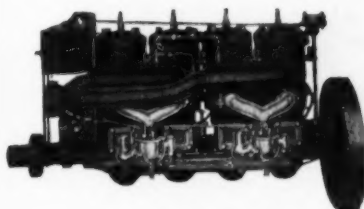
Enterprise.



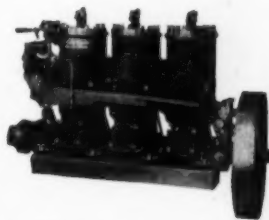
8-H.P. Essex "Standard."



32-H.P. Evansville.



20 and 34-H.P. Erd.



18-H.P. Fairbanks-Morse.

Bell Isle.

CONCRETE FORM & ENGINE CO., DETROIT, MICH.

					Inches.
1	2-2½ h.p.	600 r.p.m.	2 cycle	1 cyl.	3¼ x 2¼
2	4-5 "	600 "	2 "	1 "	4¼ x 3¼
3	6-7 "	600 "	2 "	1 "	5 x 5½
4	8-10 "	600 "	2 "	2 "	4¼ x 3¼

Continental.

CONTINENTAL MOTOR MFG. CO., MUSKEGON, MICH.

					Inches.
J	40-45 h.p.	1000 r.p.m.	4 cycle	4 cyl.	5 x 5

Cooley.

COOLEY MFG. CO., BOSTON, MASS.

					Inches.
1	5 h.p.	500 r.p.m.	2 cycle	1 cyl.	5 x 5
2	8 "	400 "	2 "	1 "	6 x 6½
3	13 "	400 "	2 "	1 "	6½ x 7½
4	10 "	500 "	2 "	2 "	5 x 5

Craig.

JAMES CRAIG, JERSEY CITY, N. J.

					Inches.
T	300 h.p.	400 r.p.m.	4 cycle	6 cyl.	11½ x 14

Harris.

DELAWARE MACHINE WORKS, WILMINGTON, DEL.

					Inches.
P	5½ h.p.	500 r.p.m.	4 cycle	1 cyl.	5½ x 6¼
A	7 "	500 "	4 "	1 "	6 x 7
R	8 "	500 "	4 "	2 "	5 x 5½
O	10 "	500 "	4 "	2 "	5½ x 6¼
U	14 "	500 "	4 "	2 "	6 x 7
S	20 "	400 "	4 "	2 "	6½ x 8½
O-25	25 "	375 "	4 "	2 "	8 x 10
T	25 "	600 "	4 "	4 "	5½ x 6¼
U-30	30 "	500 "	4 "	3 "	6 x 7
S-40	40 "	400 "	4 "	4 "	6½ x 8½
O-50	50 "	375 "	4 "	4 "	8 x 10
V	60 "	350 "	4 "	3 "	9½ x 11

Stork.

DEFOE BOAT & MOTOR WORKS, BAY CITY, MICH.

					Inches.
1	3 h.p.	700 r.p.m.	2 cycle	1 cyl.	3½ x 3¼
2	4 "	700 "	2 "	1 "	4 x 4
3	6 "	700 "	2 "	1 "	4½ x 4½
4	8 "	700 "	2 "	1 "	5 x 5
5	6 "	700 "	2 "	2 "	3½ x 3½
6	8 "	700 "	2 "	2 "	4 x 4
7	12 "	700 "	2 "	2 "	4½ x 4½
8	16 "	700 "	2 "	2 "	5 x 5
9	12 "	700 "	2 "	3 "	4 x 4
10	18 "	700 "	2 "	3 "	4½ x 4½
11	24 "	700 "	2 "	3 "	5 x 5
12	10 "	550 "	4 "	2 "	5 x 6
13	16 "	450 "	4 "	2 "	6 x 7
14	25 "	400 "	4 "	3 "	7½ x 9
15	15 "	550 "	4 "	3 "	5 x 6
16	24 "	450 "	4 "	3 "	6 x 7
17	38 "	400 "	4 "	3 "	7½ x 9
18	20 "	550 "	4 "	4 "	5 x 6
19	32 "	450 "	4 "	4 "	6 x 7
20	50 "	400 "	4 "	4 "	7½ x 9
21	30 "	550 "	4 "	6 "	5 x 6
22	40 "	450 "	4 "	6 "	6 x 7
23	75 "	400 "	4 "	6 "	7½ x 9

Detroit.

DETROIT ENGINE WORKS, DETROIT, MICH.

					Inches.
Nymph	15 h.p.	750 r.p.m.	2 cycle	2 cyl.	4¾ x 4¾
14	2-40 "	50-1000 "	2 "	1-6 "	

Liberty.

DETROIT AUTO SPECIALTY CO., DETROIT, MICH.

					Inches.
1	1½ h.p.	900 r.p.m.	2 cycle	1 cyl.	3 x 2½
2	2½ "	800 "	2 "	1 "	3½ x 3½
3	3½ "	800 "	2 "	1 "	4 x 3½
4	6½ "	750 "	2 "	1 "	5 x 4½
5	7-8 "	800 "	2 "	2 "	4 x 3½
6	12-14 "	750 "	2 "	2 "	5 x 4½

DeMooy.

DEMOOY BROS., CLEVELAND, OHIO.

					Inches.
2½	3 h.p.	800 r.p.m.	2 cycle	1 cyl.	3½ x 3¼
3½	8 "	800 "	2 "	1 "	4½ x 5
5½	10 "	600 "	2 "	1 "	5½ x 6
6	6 "	800 "	2 "	2 "	3½ x 3½
7	16 "	800 "	2 "	2 "	4½ x 5
11	20 "	650 "	2 "	2 "	5½ x 6
7½	9 "	800 "	2 "	3 "	3½ x 3½
10½	24 "	800 "	2 "	3 "	4½ x 5
16½	30 "	650 "	2 "	3 "	5½ x 6
10	12 "	800 "	2 "	4 "	3½ x 3½
14	32 "	800 "	2 "	4 "	4½ x 5
22	40 "	650 "	2 "	4 "	5½ x 6
1	10 "	350 "	4 "	1 "	7 x 9
2	20 "	350 "	4 "	2 "	7 x 9
3	30 "	350 "	4 "	3 "	7 x 9
4	40 "	350 "	4 "	4 "	7 x 9

Doak.

DOAK GAS ENGINE CO., SAN FRANCISCO, CAL.

					Inches.
1004M	100 h.p.	300 r.p.m.	4 cycle	4 cyl.	9½ x 12

Runs on gasoline, distillate or kerosene.

Doman.

THE H. C. DOMAN CO., OSHKOSH, WIS.

					Inches.
Medium Weight	8 h.p.	525 r.p.m.	4 cycle	2 cyl.	4 x 5
"	12 "	525 "	4 "	3 "	4 x 5
"	10 "	600 "	4 "	4 "	4 x 5
"	15 "	525 "	4 "	2 "	5 x 6
"	20 "	525 "	4 "	3 "	5 x 6
"	30 "	525 "	4 "	4 "	5 x 6
High Speed	25-35 "	900 "	4 "	6 "	5 x 6
Medium Weight	40-50 "	900 "	4 "	6 "	5 x 6
"	30 "	535 "	4 "	4 "	6 x 6
"	45 "	535 "	4 "	6 "	6 x 6
High Speed	55-75 "	900 "	4 "	6 "	6 x 6
Heavy Duty	8 "	400 "	4 "	1 "	6 x 8
"	16 "	400 "	4 "	2 "	6 x 8
"	24 "	400 "	4 "	3 "	6 x 8
"	32 "	400 "	4 "	4 "	6 x 8
"	20 "	350 "	4 "	2 "	7 x 9
"	30 "	350 "	4 "	3 "	7 x 9
"	40 "	350 "	4 "	4 "	7 x 9
"	60 "	350 "	4 "	6 "	7 x 9

Duryea.

DURYEA AUTO CO., SAGINAW, MICH.

					Inches.
Duryea	20 h.p.	1000 r.p.m.	2 cycle	3 cyl.	3¼ x 3¼

Eagle.

EAGLE CO., NEWARK, N. J.

					Inches.
A	1½ h.p.	700 r.p.m.	2 cycle	1 cyl.	3 x 3
B	2½ "	575 "	2 "	1 "	3½ x 4
2B	3½ "	750 "	2 "	1 "	3½ x 4
3B	7 "	750 "	2 "	2 "	3½ x 4
4B	11 "	750 "	2 "	3 "	3½ x 4
C	15 "	750 "	2 "	4 "	4½ x 5
2C	6 "	700 "	2 "	1 "	4½ x 5
3C	12 "	700 "	2 "	2 "	4½ x 5
4C	18 "	700 "	2 "	3 "	4½ x 5
D	25 "	700 "	2 "	4 "	4½ x 5
2D	5½ "	450 "	2 "	1 "	5 x 6
E	12 "	450 "	2 "	2 "	5 x 6
2E	7 "	400 "	2 "	1 "	6 x 6½
	15 "	400 "	2 "	2 "	6 x 6½

Eclipse.

ECLIPSE MOTOR CO., TRAVERSE CITY, MICH.

					Inches.
3	3 h.p.	2 cycle	1 cyl.		3½ x 3½

Cameron.

EASTERN MOTOR SALES CO., NEW YORK CITY.

					Inches.
20	20 h.p.	1200 r.p.m.	4 cycle	4 cyl.	3½ x 3½
30	30 "	1200 "	4 "	6 "	3½ x 3½

Elco.

ELECTRIC LAUNCH CO., BAYONNE, N. J.

					Inches.
40 Elco	40 h.p.	1000 r.p.m.	4 cycle	4 cyl.	5 x 4½
60 "	60 "	1000 "	4 "	6 cyl.	5 x 4½

Economy.

ECONOMY GAS ENGINE WORKS, UTICA, N. Y.

					Inches.
3½ h.p. (Per. cyl.)	500 r.p.m.	2 cycle	1-4		4½ x 5

Emerson.

EMERSON ENGINE CO., ALEXANDRIA, VA.

					Inches.
Single Cylinder	8-10 h.p.	250-1000 r.p.m.	2 cycle	1 cyl.	5 x 5
Double	16-20 "	250-1000 "	2 "	2 "	5 x 5
Four	32-40 "	250-1000 "	2 "	4 "	5 x 5
Racing Four	60-70 "	1100 "	2 "	4 "	5 x 5
" Six	100-125 "	1100 "	2 "	6 "	5 x 5
Cruising Four	40-100 "	450-900 "	4 "	4 "	7½ x 8
" Eight	80-200 "	450-900 "	4 "	8 "	7½ x 8
Racing	100-250 "	800-1000 "	4 "	8 "	7½ x 8

New Parker.

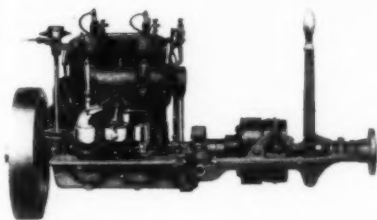
G. J. EMENY CO., FULTON, N. Y.

					Inches.
Midget	2 h.p.	2000 r.p.m.	2 cycle	1 cyl.	3 x 3
Double Midget	4 "	1600 "	2 "	2 "	3 x 3
Parker	4 "	1300 "	2 "	1 "	4 x 4
	8-10 "	1200 "	2 "	2 "	4 x 4

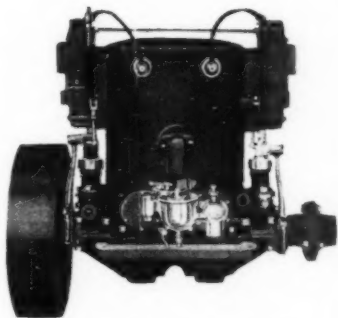
Erd.

ERD MOTOR COMPANY, SAGINAW, MICH.

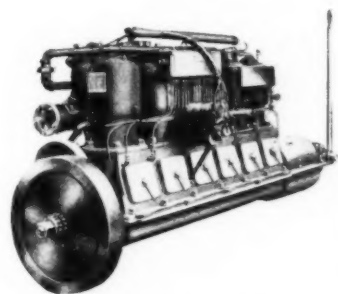
					Inches.
Model Standard	3½ h.p.	850 r.p.m.	2 cycle	1 cyl.	3½
"	5 "	800 "	2 "	1 "	4 x 4
"	7 "	850 "	2 "	2 "	3½ x 3½
"	10 "	800 "	2 "	2 "	4 x 4
"	16 "	750 "	2 "	2 "	5 x 5
"	12 "	850 "	2 "	3 "	3½ x 3½
"	15 "	800 "	2 "	3 "	4 x 4
"	25 "	750 "	2 "	3 "	5 x 5
"	30 "	800 "	2 "	4 "	4 x 4
"	34 "	750 "	2 "	4 "	5 x 5
"	60 "	800 "	2 "	6 "	5 x 5
High Speed	30 "	1400 "	2 "	2 "	3½ x 4½
"	40 "	1400 "	2 "	4 "	4½ x 4½
"	60 "	1400 "	2 "	6 "	4½ x 4½
Heavy Duty	12 "	500 "	4 "	2 "	5 x 6
"	20 "	425 "	4 "	2 "	6½ x 7½
"	18 "	500 "	4 "	3 "	5 x 6
"	30 "	425 "	4 "	3 "	6½ x 7½
"	24 "	600 "	4 "	4 "	5 x 6
"	40 "	425 "	4 "	4 "	6½ x 7½



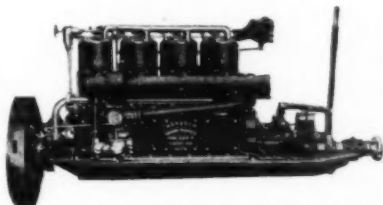
A Ferro with reverse gear incorporated.



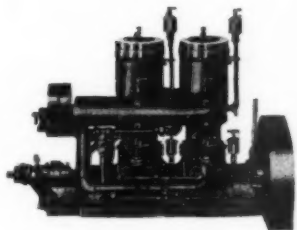
A Fulton with reciprocating magnetos.



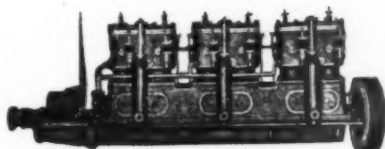
A Speedway, 6-cylinder model.



Monarch with "Bipass" for kerosene.



16-H.P. Green Bay.



Hall Gas Engine.

Essex.

THE ESSEX ENGINE CO., LYNN, MASS.

Essex	h.p.	r.p.m.	cycle	cyl.	Inches.
Standard	3	500	2	1	3 1/2 x 4 1/2
"	4 1/2	500	2	1	4 1/2 x 5 1/2
"	6	450	2	1	5 x 6
"	8	450	2	1	6 x 6
"	9	500	2	2	4 1/2 x 5 1/2
"	12	450	2	2	5 x 6
"	16	450	2	2	6 x 6

The Evansville.

EVANSVILLE GAS ENGINE CO., EVANSVILLE, IND.

	h.p.	r.p.m.	cycle	cyl.	Inches.
1	7 1/2	500	4	2	4 1/2 x 5
2	10	500	4	2	6 x 6 1/2
3	15	500	4	4	4 1/2 x 5
4	32	500	4	4	6 x 6 1/2

Evinrude.

EVINRUDE MOTOR CO., MILWAUKEE, WIS.

	h.p.	r.p.m.	cycle	cyl.	Inches.
1	1 1/2	900	2	1	2 1/2 x 2 1/2

Detachable, for use on row boats.

Fairbanks-Morse.

FAIRBANKS, MORSE & CO., CHICAGO.

Model.	h.p.	r.p.m.	cycle	cyl.	Inches.
E	3 1/2	800	2	1	3 1/2 x 3 1/2
G	7	800	2	2	4 1/2 x 4 1/2
G	6	800	2	1	4 1/2 x 4 1/2
G	12	800	2	2	4 1/2 x 4 1/2
G	18	800	2	3	4 1/2 x 4 1/2
G	24	800	2	4	4 1/2 x 4 1/2
J	7	450	2	1	5 1/2 x 6
J	15	450	2	2	5 1/2 x 6
P	10	600	4	2	5 1/2 x 6 1/2
P	25	600	4	3	5 1/2 x 6 1/2
P	35	600	4	4	5 1/2 x 6 1/2
S	4 1/2	800	4	1	4 1/2 x 4 1/2
S	9	800	4	2	4 1/2 x 4 1/2
S	18	800	4	4	4 1/2 x 4 1/2
B	20	350	4	2	7 1/2 x 8
B	30	350	4	3	7 1/2 x 8
B	40	350	4	4	7 1/2 x 8
B	50	300	4	2	11 x 12
B	75	300	4	3	11 x 12
B	100	300	4	4	11 x 12

Models E and G use gasoline, distillate or benzine; Models J use gasoline, kerosene, or distillate; Models P, S and B use gasoline, kerosene, naphtha, distillate, benzine, solar oil or alcohol.

Ferro Marine.

FERRO MACHINE & FOUNDRY CO., CLEVELAND, OHIO.

Ferro	h.p.	r.p.m.	cycle	cyl.	Inches.
Special	3	700-900	2	1	3 1/2 x 3 1/2
O	4	600-800	2	1	3 1/2 x 3 1/2
F	5 1/2	600-800	2	1	4 1/2 x 4 1/2
K	7 1/2	550-800	2	1	5 x 5
P	8	600-800	2	2	3 1/2 x 3 1/2
G	11	600-800	2	2	4 1/2 x 4 1/2
L	15	550-800	2	2	5 x 5
R	12	600-800	2	3	3 1/2 x 3 1/2
H	17	600-800	2	3	4 1/2 x 4 1/2
M	25	550-800	2	3	5 x 5

Frisbie.

FRISBIE MOTOR CO., MIDDLETOWN, CONN.

	h.p.	r.p.m.	cycle	cyl.	Inches.
A	3-5	500	4	1	4 1/2 x 5
C	4-7	450	4	1	6 x 6
B	6-10	500	4	2	4 1/2 x 5
D	10-14	450	4	2	6 x 6
E	16-25	650	4	4	4 1/2 x 5
F	30-40	650	4	4	6 x 6
K	35-50	900	6	6	4 1/2 x 5
L	50-75	815	6	6	6 x 6

Fulton.

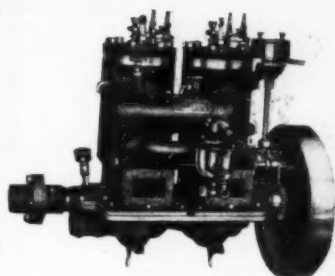
FULTON MFG. CO., ERIE, PA.

	h.p.	r.p.m.	cycle	cyl.	Inches.
1	2 1/2	650	2	1	3 1/2 x 4
2	5	600	2	1	4 1/2 x 5
3	7 1/2	500	2	1	5 1/2 x 6
4	6	650	2	2	3 1/2 x 4
5	10	600	2	2	4 1/2 x 5
6	15	500	2	2	5 1/2 x 6

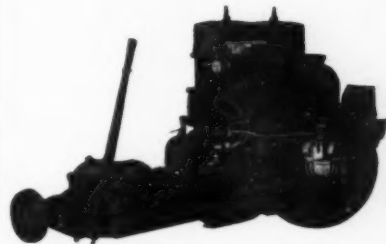
Speedway.

GAS ENGINE & POWER CO., MORRIS HEIGHTS, NEW YORK CITY.

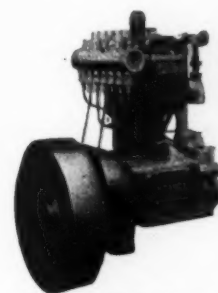
	h.p.	cycle	cyl.	Inches.
1	5	2	1	4 1/2 x 5
2	12-16	4	4	4 x 4 1/2
3	8-10	4	2	4 1/2 x 5
4	12-14	4	3	4 1/2 x 5
5	18-22	4	4	4 1/2 x 5
6	24-32	4	6	4 1/2 x 5
7	32-40	4	4	6 x 6
8	50-60	4	6	6 x 6
9	50-60	4	4	6 1/2 x 8
10	80-100	4	6	6 1/2 x 8
12	Special	4	6	6 1/2 x 8
11	90-120	4	4	8 1/2 x 10
12	135-175	4	6	8 1/2 x 10
Special	200	4	6	8 x 8
Special	250-300	4	6	11 x 12
Air Starting and reversing	135-175	4	6	8 1/2 x 10
"	250-300	4	6	11 x 12



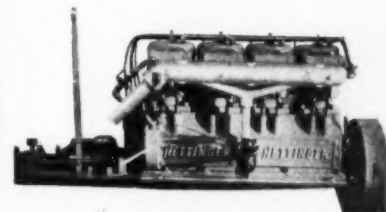
8, 11, 14 and 17 H.P. Hamilton models.



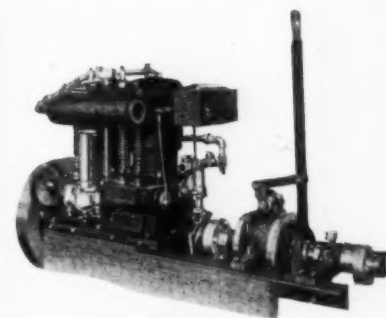
14, 16 and 24 H.P. Gray models.



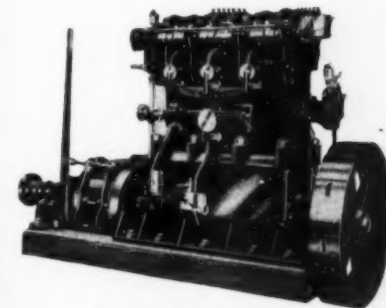
4-cycle, 5-H.P. Heinel.



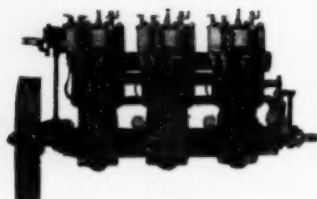
Hettinger 36-H.P. medium duty.



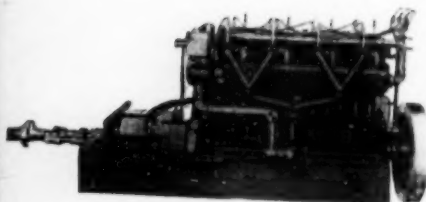
15 H.P. Holliday.



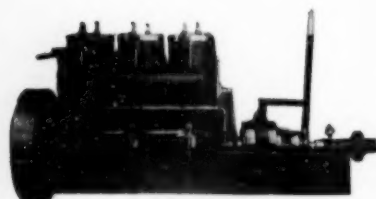
A 3-cylinder Imperial.



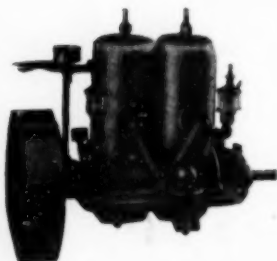
R. & D.



One of the 4-cylinder Lamb models.



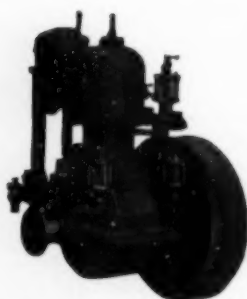
24-H.P. Lathrop.



4, 9 and 14-H.P. "Wat."



4-H. P. Lillis.



A 4-cycle Missouri.

Smalley.

GENERAL MACHINERY CO., BAY CITY, MICH.

M3B	25-30 h.p.	1000 r.p.m.	2 cycle	3 cyl.	Inches. 4 1/2 x 4 1/2
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Gorham.

GORHAM ENG. CO., OAKLAND, CAL.

Gorham	5 h.p.	500 r.p.m.	4 cycle	1 cyl.	Inches. 5 1/2 x 6
"	10 "	500 "	4 "	2 "	5 1/2 x 6
"	15 "	500 "	4 "	3 "	5 1/2 x 6
"	20 "	500 "	4 "	4 "	5 1/2 x 6
"	30 "	325 "	4 "	2 "	8 1/4 x 10 1/2
"	50 "	325 "	4 "	3 "	8 1/4 x 10 1/2
"	70 "	325 "	4 "	4 "	8 1/4 x 10 1/2
"	100 "	325 "	4 "	6 "	8 1/4 x 10 1/2

All models can be used with gasoline, benzine or distillate.

Monarch.

GRAND RAPIDS GAS ENG. AND YACHT CO., GRAND RAPIDS, MICH.

	h.p.	525-725 r.p.m.	4 cycle	1 cyl.	Inches.
5-7	"	525-725	4	2	5 x 6
10-15	"	525-725	4	2	5 x 6
15-20	"	525-725	4	3	5 x 6
20-30	"	525-725	4	4	5 x 6
30-45	"	525-725	4	6	5 x 6
14-20	"	525-725	4	2	6 x 7
21-30	"	525-725	4	3	6 x 7
28-40	"	525-725	4	4	6 x 7
42-60	"	525-725	4	6	6 x 7
26-34	"	375-500	4	2	8 x 9
39-51	"	375-500	4	3	8 x 9
52-68	"	375-500	4	4	8 x 9
78-102	"	375-500	4	6	8 x 9
40-56	"	325-450	4	2	10 x 10
60-84	"	325-450	4	3	10 x 10
80-112	"	325-450	4	4	10 x 10
120-168	"	325-450	4	6	10 x 10

Gasoline or kerosene.

Gray.

GRAY MOTOR CO., DETROIT, MICH.

R	3 h.p.	800 r.p.m.	2 cycle	1 cyl.	Inches. 4 x 3
RR	4 1/2 "	700 "	2 "	1 "	4 x 4
R	6 "	700 "	2 "	1 "	4 1/4 x 4
RR	9 "	700 "	2 "	2 "	4 x 4
R	12 "	700 "	2 "	2 "	4 1/4 x 4
T	7 "	700 "	2 "	1 "	4 1/4 x 4
T	8 "	650 "	2 "	1 "	4 1/4 x 5
T	12 "	600 "	2 "	1 "	5 1/4 x 5
T	14 "	700 "	2 "	2 "	4 1/4 x 4
T	16 "	650 "	2 "	2 "	4 1/4 x 5
T	24 "	600 "	2 "	2 "	5 1/4 x 5
T	21 "	700 "	2 "	3 "	4 1/4 x 4
T	36 "	600 "	2 "	3 "	5 1/4 x 5

Use either gasoline or kerosene.

Sorge.

GREEN BAY MACHINE CO., GREEN BAY, WIS.

Sorge	12 h.p.	400 r.p.m.	2 cycle	2 cyl.	Inches. 4 1/4 x 5 1/4
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Grimm.

GRIMM MFG. CO., BUFFALO, N. Y.

A	800 r.p.m.	4 cycle	4 cyl.	Inches. 3 1/4 x 4 1/2
B	800-1200 "	4 "	6 "	3 1/4 x 4 1/2

Gasoline or kerosene.

American Kerosene Oil.

C. W. HATCH, BROOKLYN, N. Y.

A	4 h.p.	1000 r.p.m.	2 cycle	1 cyl.	Inches. 3 1/2 x 3 1/2
B	6 "	800 "	2 "	1 "	4 1/2 x 4
A	8 "	1000 "	2 "	2 "	3 1/2 x 3 1/2
H	9 "	600 "	2 "	1 "	5 1/4 x 6
A	12 "	1000 "	2 "	3 "	3 1/2 x 3 1/2
B	12 "	800 "	2 "	2 "	4 1/2 x 4
D	13 "	600 "	2 "	1 "	6 1/4 x 6
A	16 "	1000 "	2 "	4 "	3 1/2 x 3 1/2
E	16 "	500 "	2 "	1 "	6 1/4 x 8
B	18 "	800 "	2 "	3 "	4 1/2 x 4
H	18 "	600 "	2 "	2 "	5 1/4 x 6
H	24 "	800 "	2 "	4 "	4 1/2 x 4
D	26 "	600 "	2 "	2 "	6 1/4 x 6
H	27 "	600 "	2 "	3 "	5 1/4 x 6
K	36 "	360 "	2 "	1 "	10 1/2 x 10
E	36 "	500 "	2 "	2 "	6 1/4 x 8
H	36 "	600 "	2 "	4 "	5 1/4 x 6
D	48 "	500 "	2 "	3 "	6 1/4 x 6
E	52 "	600 "	2 "	4 "	6 1/4 x 8
E	64 "	500 "	2 "	4 "	6 1/4 x 8
K	76 "	360 "	2 "	2 "	10 1/2 x 10
K	115 "	360 "	2 "	3 "	10 1/2 x 10
K	150 "	360 "	2 "	4 "	10 1/2 x 10

Hazard Unit Marine Power Plant.

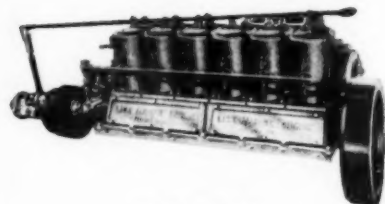
HAZARD MOTOR MFG. CO., ROCHESTER, N. Y.

BFM	15-25 h.p.	700-1500 r.p.m.	4 cycle	4 cyl.	Inches. 4 x 4 1/2
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Hamilton.

HAMILTON MOTOR WORKS, HAMILTON, CANADA.

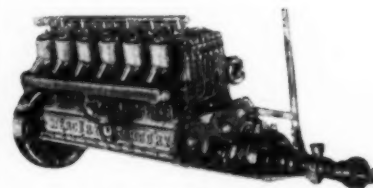
	2 1/2 h.p.	2 cycle	1 cyl.	Inches. 3 1/4 x 3
1	6 "	2 "	2 "	3 1/4 x 3
2	9 "	2 "	3 "	4 x 3 1/2
3	12 "	2 "	1 "	4 1/2 x 4 1/2
4	15 "	2 "	1 "	5 x 5
5	18 "	2 "	1 "	5 1/4 x 5 1/4
6	21 "	2 "	2 "	4 x 3 1/2
7	24 "	2 "	2 "	4 1/2 x 4 1/2
8	27 "	2 "	2 "	5 x 5
9	30 "	2 "	2 "	5 1/4 x 5 1/4
10	33 "	2 "	2 "	5 1/2 x 5 1/2
11	36 "	2 "	3 "	4 1/2 x 4 1/2
12	39 "	2 "	3 "	5 x 5
13	42 "	2 "	3 "	4 1/2 x 4 1/2
14	45 "	2 "	3 "	5 x 5
15	48 "	2 "	3 "	5 1/4 x 5 1/4
16	51 "	2 "	3 "	4 1/2 x 5
17	54 "	2 "	3 "	4 1/2 x 5
18	57 "	2 "	4 "	4 1/2 x 5
19	60 "	2 "	4 "	4 1/2 x 6
20	63 "	2 "	4 "	4 1/2 x 6
21	66 "	2 "	4 "	4 1/2 x 6
22	69 "	2 "	6 "	4 1/2 x 6



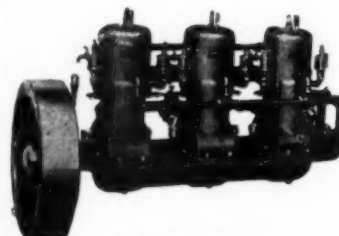
30-H.P. Lisk.



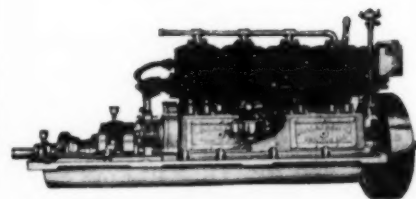
The Loane Hiltz "Fisherman."



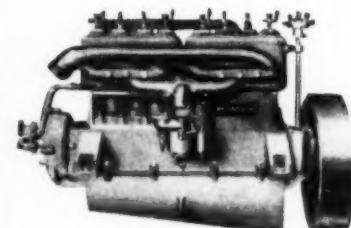
90-100-H.P. Mercury.



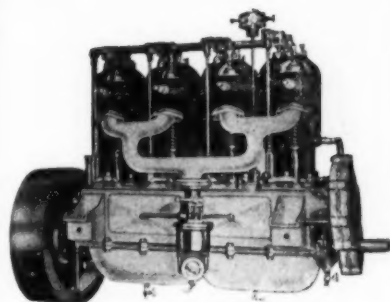
12-H.P. "Hanley."



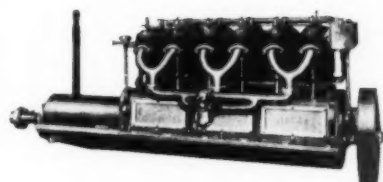
A Miller with reverse gear incorporated.



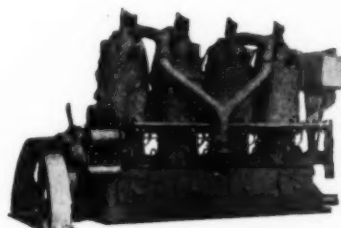
The Kermath.



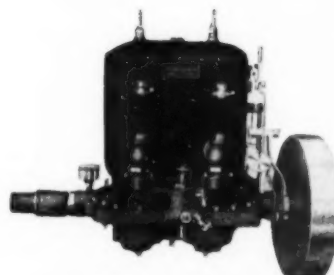
The "Model."



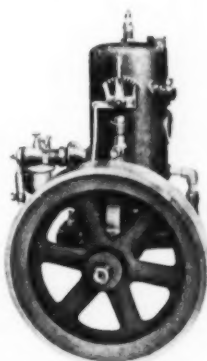
38-65 and 60-90 H. P. Niagara.



The Nichols "Kerosene."



10-H.P. Northwestern.



The Northwestern Special.

The Heer 2-Cylinder Opposed Type.
THE HEER ENGINE CO., PORTSMOUTH, O.

	h.p.	r.p.m.	cycle	cyl.	Inches.
2 cyl. opposed	6	550	4	2	5 x 5
"	8	500	4	2	5 x 6
"	10	500	4	2	6 x 6
"	16	500	4	2	7 x 7
"	25	450	4	2	7 x 10
"	40	350	4	2	9 x 10

Used with gasoline or kerosene.

Heinel.
H. A. HEINEL CO., WILMINGTON, DELAWARE.

	h.p.	r.p.m.	cycle	cyl.	Inches.
A	5	500	4	1	5 x 5
B	10	500	4	2	5 x 5

Holliday.
HOLLIDAY ENGINEERING CO., CHICAGO, ILL.

	h.p.	r.p.m.	cycle	cyl.	Inches.
D 1	2 1/2	600	4	1	3 1/2 x 5
D 2	5	600	4	2	3 1/2 x 5
G 1	5	550	4	1	5 x 6
H 1	7 1/2	500	4	1	6 x 7
K 1	10	400	4	1	7 x 9
G 2	10	500	4	2	5 x 6
H 2	15	500	4	2	6 x 7
K 2	20	400	4	2	7 x 9
G 4	20	500	4	4	5 x 6
H 4	30	500	4	4	6 x 7
K 4	40	400	4	4	7 x 9

All but the first two models are run on gasoline or kerosene.

Imperial.
IMPERIAL GAS ENGINE CO., SAN FRANCISCO, CAL.

	h.p.	r.p.m.	cycle	cyl.	Inches.
A	4	425	4	1	5 x 5 1/4
B	6	400	4	1	5 3/4 x 6 1/2
C	8	375	4	1	6 1/4 x 7 1/4
A 2	8	425	4	2	5 x 5 1/2
B 2	10	400	4	2	5 1/4 x 6 1/4
CT	12	400	4	2	6 x 7
C 2	16	375	4	2	6 1/4 x 7 1/4
D 2	20	350	4	2	7 1/2 x 9
E 2	30	325	4	2	8 1/4 x 10 1/2
C 3	25	375	4	3	6 1/4 x 7 1/4
D 3	35	350	4	3	7 1/4 x 8 1/4
E 3	55	325	4	3	8 1/4 x 10 1/2
F 3	75	280	4	3	9 3/4 x 12
G 3	90	280	4	3	10 1/2 x 13
A 4	25	450	4	4	5 1/2 x 6 1/4
B 4	30	425	4	4	6 x 7
C 4	35	375	4	4	6 1/4 x 7 1/4
D 4	50	350	4	4	7 1/2 x 9
E 4	75	325	4	4	8 1/4 x 10 1/2
G 4	125	300	4	4	10 1/2 x 13

Can be used with gasoline or engine distillate.

Ralaco.
THE S. M. JONES CO., TOLEDO, OHIO.

	h.p.	r.p.m.	cycle	cyl.	Inches.
1	8-10	600	4	2	4 x 6
2	12-15	500	4	2	5 x 7
3	15-20	600	4	4	4 x 6
4	23-25	375	4	2	7 x 9
5	25-30	500	4	4	5 x 7
6	45-50	375	4	4	7 x 9

Kahlenberg.
KAHLENBERG BROS. CO., TWO RIVERS, WIS.

	h.p.	cycle	cyl.	Inches.
1	2	2	1	3 1/2 x 3 1/2
2	3	2	1	4 x 4
3	4	2	1	5 x 5
4	5	2	1	5 x 6
5	6	2	1	6 1/2 x 6
6	7	2	1	6 x 6
7	9	2	1	6 1/2 x 7
8	12	2	1	7 x 8
9	15	2	1	7 1/4 x 8
10	6	2	2	4 x 4
11	8	2	2	5 x 5
12	10	2	2	5 x 6
13	12	2	2	5 1/2 x 6
14	14	2	2	6 x 6
15	18	2	2	6 1/2 x 7
16	24	2	2	7 x 8
17	30	2	2	7 1/4 x 8
18	50	2	2	9 x 10
19	9	2	3	4 x 4
20	12	2	3	5 x 5
21	15	2	3	5 x 6
22	18	2	3	5 1/2 x 6
23	21	2	3	6 x 6
24	27	2	3	6 1/2 x 7
25	36	2	3	7 x 8
26	45	2	3	7 1/4 x 8
27	75	2	3	9 x 10

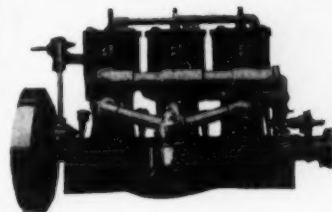
Used with gasoline and oil distillate.

Kawalsky.
KAWALSKY MOTOR WORKS, VERONA, PA.

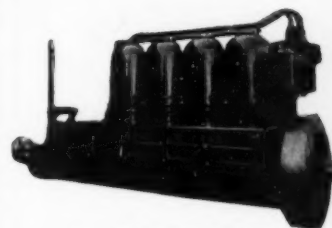
	h.p.	r.p.m.	cycle	cyl.	Inches.
5	5	650	2	1	4 1/2 x 4 1/2
10	10	650	2	2	4 1/2 x 4 1/2

Lackawanna Valveless Reversible.
LACKAWANNA MFG. CO., NEW YORK CITY.

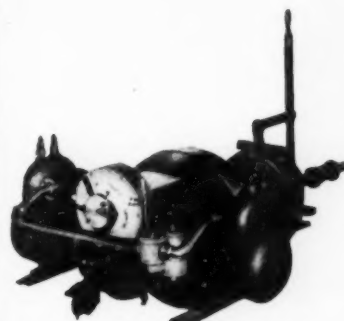
	h.p.	r.p.m.	cycle	cyl.	Inches.
K	2 1/2	700-960	2	1	3 x 3
L	4 1/2	600-750	2	1	4 x 4 1/2
M	4-5	700-1000	2	2	3 x 3
O	9	600-850	2	2	4 x 4
P	12	600-950	2	2	4 1/2 x 4 1/2
R	15	550-695	2	2	5 x 5
A	22-25	550-700	2	3	5 x 5
F	27	700-1000	2	4	4 1/2 x 4 1/2
G	30-35	550-725	2	4	5 x 5
H	45-55	550-750	2	6	5 x 5



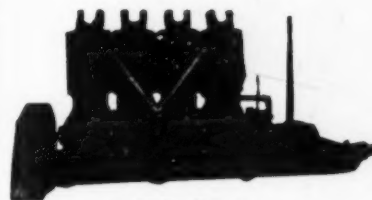
9 and 21-H.P. Ontario.



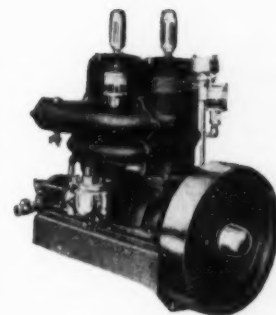
40-50 H.P. "Pearl."



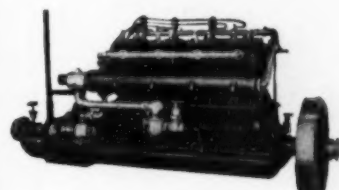
8-10 H.P. Phillips Duplex.



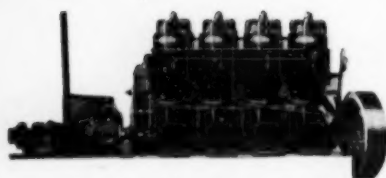
40-H.P. Porter.



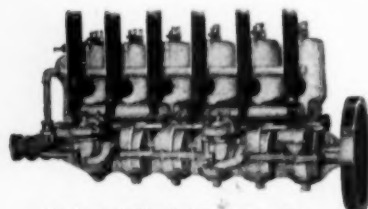
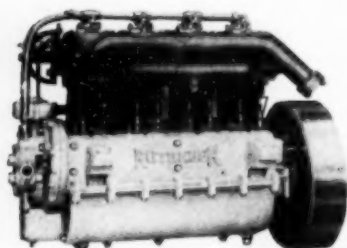
6-8 and 10-12 H.P. Puritan.



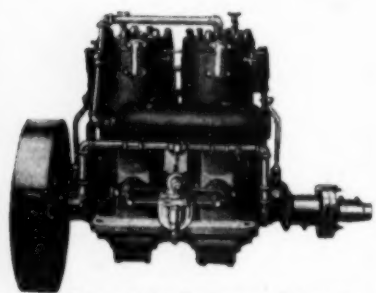
24-H.P. medium duty Regal.



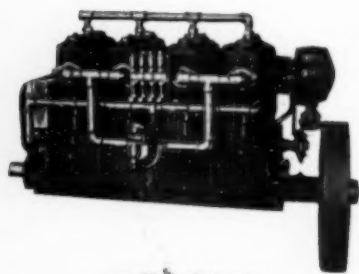
75-H.P. Remington Kerosene.

Roberts' Model 6-P Aerolite,
60-H.P., 365 Lbs.

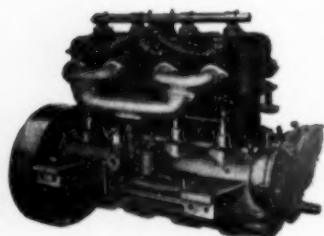
The Rutenber.



One of the Sagamore "double-cylinders."



20-H.P. Schaefer.



24-30 H.P. Schlosser.

Lamb.

LAMB ENGINE CO., NEW YORK CITY.

	h.p.	r.p.m.	cycle	cyl.	Inches.
F	10	400	4	2	4 1/2 x 6 3/4
R	12	500	4	2	5 1/4 x 6
R	18	500	4	3	5 1/4 x 6
R	24	500	4	4	5 1/4 x 6
R	40	500	4	6	5 1/4 x 6
H	20	450	4	2	6 3/8 x 7
H	30	450	4	3	6 3/8 x 7
H	40	450	4	4	6 3/8 x 7
RS	30-40	450	4	4	5 1/4 x 6
RS	60-70	450	4	6	5 1/4 x 6

L-A Marine.

LOCKWOOD ASH MOTOR CO., JACKSON, MICH.

	h.p.	r.p.m.	cycle	cyl.	Inches.
1	2 1/2	700	2	1	3 1/4 x 3 1/2
2	4	700	2	1	4 x 4
3	5	700	2	2	3 1/4 x 3 1/2
4	8	700	2	2	4 x 4
5	7 1/2	700	2	3	3 1/4 x 3 1/2
6	12	700	2	2	4 1/2 x 4 1/2
7	18	700	2	3	4 1/2 x 4 1/2
8	25	700	2	4	4 1/2 x 4 1/2

Loew-Victor.

LOEW MFG. CO., CLEVELAND, OHIO.

	h.p.	r.p.m.	cycle	cyl.	Inches.
1 cyl.	6	600	4	1	4 1/4 x 5 1/2
2 "	12	600	4	2	4 1/4 x 5 1/2
3 "	18	600	4	3	4 1/4 x 5 1/2
4 "	20-30	650-1100	4	4	4 1/2 x 5
5 "	24-40	600-1000	4	4	4 1/2 x 5 1/2
6 "	36-60	600-1000	4	6	4 1/2 x 5 1/2

Either gasoline or kerosene.

Fisherman.

LOANE HILTZ ENGINE CO., BALTIMORE, MD.

	h.p.	r.p.m.	cycle	cyl.	Inches.
A	6	500	4	1	5 x 6
B reversible	6	500	4	1	5 x 6

Uncle Sam.

THOMAS LILLIS, GRASSY POINT, ROCKLAND CO., N. Y.

	h.p.	r.p.m.	cycle	cyl.	Inches.
A	4	400	2	1	4 1/2 x 5

Missouri.

H. LIPPERT, ST. LOUIS, MO.

	h.p.	r.p.m.	cycle	cyl.	Inches.
1	3 1/2	500	4	1	4 x 5
2	5	500	4	1	5 x 6
3	6	500	4	2	4 x 5
4	8	500	4	2	4 3/8 x 5
5	10	500	4	2	5 x 6
6	16	500	4	4	4 3/8 x 5
7	24	500	4	4	5 x 6

Lisk.

GEORGE A. LISK, MANUFACTURING MACHINIST, DETROIT, MICH.

	h.p.	r.p.m.	cycle	cyl.	Inches.
1	5	600	4	1	4 1/2 x 5
2	10	600	4	2	4 1/2 x 5
3	15	600	4	3	4 1/2 x 5
4	20	600	4	4	4 1/2 x 5
5	30	600	4	6	4 1/2 x 5
6	15	700	4	4	3 1/4 x 4
7	40	500	4	4	6 x 7

Loveland.

LOVELAND MFG. CO., BRIDGETON, N. J.

	h.p. per cyl.	r.p.m.	cycle	Cyl.	Inches.
Lovelands	5	550	2	1-2-3-4	4 1/2 x 5
"	8	550	2	1-2-3-4	5 3/4 x 6

Mercury.

MERCURY MOTOR CO., LONG ISLAND CITY, N. Y.

	h.p.	r.p.m.	cycle	cyl.	Inches.
1	6	800	4	1	4 1/2 x 5
2	14	800	4	2	4 1/2 x 5
3	25	800	4	4	4 1/2 x 5
4	40	800	4	4	5 x 5
5	60	800	4	6	6 1/8 x 6 1/2
6	90	800	4	6	6 1/8 x 6 1/2

Mianus.

THE MIANUS MOTOR WORKS, STAMFORD, CONN.

	h.p.	r.p.m.	cycle	cyl.	Inches.
X	3	550	2	1	4 x 4
X	5	500	2	1	4 1/2 x 4
X	6	550	2	2	4 x 4
X	7 1/2	450	2	1	5 9/16 x 6
X	10	500	2	2	4 3/8 x 5
XI	15	425	2	2	5 9/16 x 6
XI	10	385	2	1	6 1/2 x 7
XI	20	385	2	2	6 1/2 x 7
XI	30	385	2	3	6 1/2 x 7
XI	40	385	2	4	6 1/2 x 7

Either gasoline or kerosene.

Mickelson.

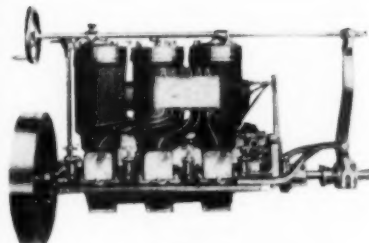
MICKELSON MOTOR CO., MILWAUKEE, WIS.

	h.p.	r.p.m.	cycle	cyl.	Inches.
D	24	900	4	4	4 1/2 x 5
E	35	800	4	4	5 x 6 1/2
H	15	900	4	2 opp.	5 x 5
G	30	900	4	4	5 x 5

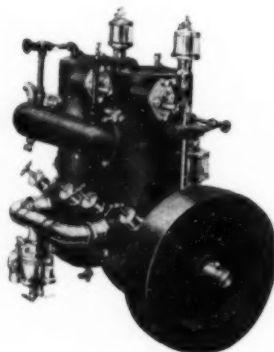
Hanly.

MIDLAND ENGINE WORKS, MIDLAND, ONT.

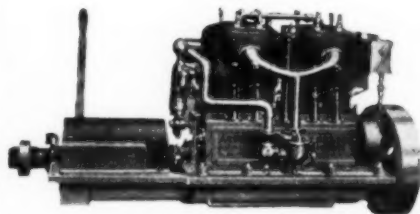
	h.p.	r.p.m.	cycle	cyl.	Inches.
Baby Hanly	1 1/2	700-800	2	1	3 x 2 1/2
1	2	480-560	2	1	4 x 4
2	4	480-560	2	1	5 x 5
3	6	480-560	2	1	5 1/4 x 5 1/2
4	8	480-560	2	2	5 x 5
5	12	480-560	2	3	5 x 5



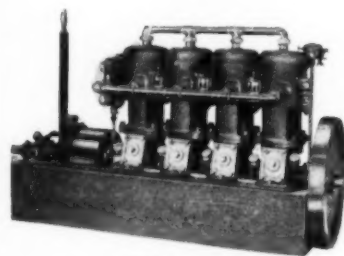
A Smalley.



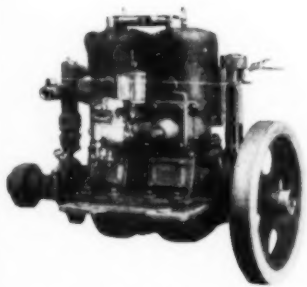
15-H.P. Spaulding.



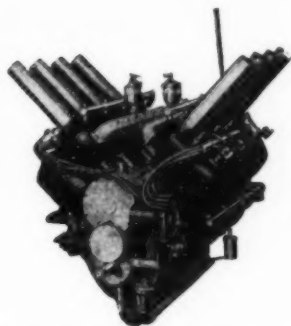
One of the Sterlings.



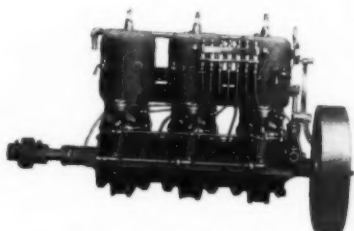
32-H.P. Stuart.



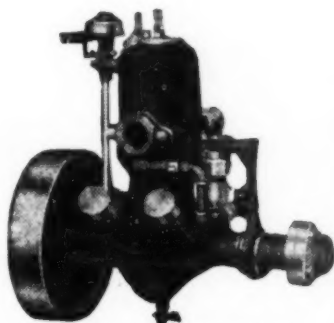
T. & M., Model "A," medium duty.



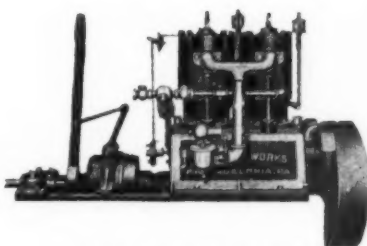
8-cylinder, 80-H.P. Trebert "V."



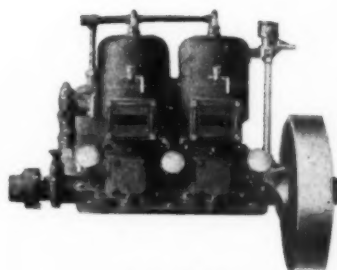
15-H.P. Tuttle, Model 3N.



3 and 6 H.P. "Toledo."



One of the Vulcan models.



8-H.P. Wayne.

Miller.

MILLER BROS., CHICAGO, ILL.

Miller	8 h.p.	600 r.p.m.	4 cycle	2 cyl.	Inches.
"	12 "	500 "	4 "	2 "	4 1/4 x 5
"	16 "	450 "	4 "	2 "	5 1/4 x 6
"	16 "	600 "	4 "	4 "	5 x 7
"	24 "	500 "	4 "	4 "	4 1/2 x 5
"	30 "	450 "	4 "	4 "	5 1/4 x 6
"	40 "	400 "	4 "	4 "	6 x 7
"	60 "	350 "	4 "	4 "	7 x 8
"					7 x 10

Model.

MODEL GAS ENGINE WORKS, PERU, IND.

All sizes from 3 1/4 x 4 1/2 in. to 16 1/2 x 26 in.

Special.

MODERN MACHINERY CO., WILMINGTON, DEL.

Special motors of all kinds and sizes.

Kermath.

MORTON MOTOR CO., DETROIT, MICH.

One only	10-12 h.p.	800-1000 r.p.m.	4 cycle	4 cyl.	Inches.
					3 1/2 x 4

20th Century.

THE NEW YORK YACHT, LAUNCH AND ENGINE CO., MORRIS HEIGHTS, N. Y.

	12-16 h.p.	400 r.p.m.	4 cycle	2 cyl.	Inches.
1	12-16 "	400 "	4 "	2 "	5 1/4 x 7 1/4
2	18-23 "	400 "	4 "	3 "	5 1/4 x 7 1/4
3	24-30 "	400 "	4 "	4 "	5 1/4 x 7 1/4
4	30-40 "	400 "	4 "	4 "	6 1/4 x 8 1/4
5	50-65 "	350 "	4 "	4 "	8 x 10
6	45 "	400 "	4 "	6 "	8 1/4 x 7 1/4
7	65 "	400 "	4 "	6 "	8 1/4 x 8 1/4
8	100 "	400 "	4 "	6 "	8 x 10

Niagara.

NIAGARA GASOLINE MOTOR CO., BUFFALO, N. Y.

	5 h.p.	500 r.p.m.	4 cycle	2 cyl.	Inches.
A2	5 "	500 "	4 "	2 "	3 1/2 x 4 1/2
B2	9 "	500 "	4 "	2 "	4 1/2 x 5 1/2
A4	10-15 "	500-900 "	4 "	4 "	3 1/2 x 4 1/2
B4	18-25 "	500-900 "	4 "	4 "	4 1/2 x 5 1/2
C4	25-45 "	500-900 "	4 "	4 "	5 1/2 x 6 1/2
D4	40-65 "	500-900 "	4 "	4 "	6 1/4 x 6 1/4
C6	38-65 "	500-900 "	6 "	6 "	5 1/2 x 6 1/2
D6	60-90 "	500-900 "	6 "	6 "	5 1/4 x 6 1/2

Nichols Kerosene Oil Engine.

NICHOLS POWER CO., STAMFORD, CONN.

Type D	35-40 h.p.	550 r.p.m.	4 cycle	4 cyl.	Inches.
	25-30 "	600 "	4 "	4 "	7 x 6
					6 x 6

The Valveless.

NICHOLS & WRIGHT MOTOR CO., BUFFALO, N. Y.

	2-2 1/2 h.p.	100-900 r.p.m.	2 cycle	1 cyl.	Inches.
1	2-2 1/2 "	100-900 "	2 "	1 "	3 x 3
2	3-3 1/2 "	100-900 "	2 "	1 "	3 1/2 x 3 1/2
3	4-5 "	100-900 "	2 "	1 "	4 x 4
4	7-8 "	100-900 "	2 "	2 "	3 1/2 x 3 1/2
5	10-12 "	100-900 "	2 "	2 "	4 x 4
6	12-16 "	50-600 "	2 "	2 "	5 x 5
7	10-12 "	100-900 "	2 "	3 "	3 1/2 x 3 1/2
8	18-24 "	50-500 "	2 "	3 "	5 x 5
9	13-16 "	100-900 "	2 "	4 "	3 1/2 x 3 1/2
10	20-24 "	100-900 "	2 "	4 "	4 x 4

Northwestern.

NORTHWESTERN STEEL AND IRON WORKS, EAU CLAIRE, WIS.

	2 h.p.	800 r.p.m.	2 cycle	1 cyl.	Inches.
1	2 "	800 "	2 "	1 "	3 x 3
2	3 "	700 "	2 "	1 "	3 1/2 x 3 1/2
3	4 "	600 "	2 "	1 "	4 x 4 1/2
4	6 "	600 "	2 "	1 "	4 x 5
5	10 "	600 "	2 "	2 "	4 x 4 1/2

Ontario.

ONTARIO IRON WORKS, PULASKI, N. Y.

Ont. 2-Cycle, 3-Port Valveless.

	3 h.p.	900 r.p.m.	2 cycle	1 cyl.	Inches.
3	3 "	900 "	2 "	1 "	3 1/2 x 3 1/2
6	6 "	900 "	2 "	2 "	3 1/2 x 3 1/2
9	9 "	900 "	2 "	3 "	3 1/2 x 3 1/2
12	12 "	900 "	2 "	4 "	3 1/2 x 3 1/2
7	7 "	450 "	2 "	1 "	5 x 5
14	14 "	600 "	2 "	2 "	5 x 5
21	21 "	600 "	2 "	3 "	5 x 5
28	28 "	600 "	2 "	4 "	5 x 5

Pearl.

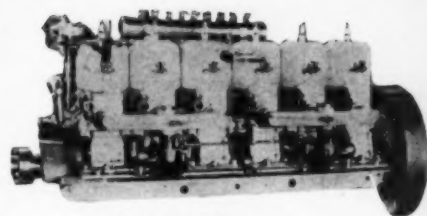
A. A. ORNISKEE & CO., TAUNTON, MASS.

	6-7 h.p.	550 r.p.m.	4 cycle	1 cyl.	Inches.
6-7	6-7 "	550 "	4 "	1 "	5 1/4 x 6
12-14	12-14 "	550 "	4 "	2 "	5 1/4 x 6
24-30	24-30 "	550 "	4 "	4 "	5 1/4 x 6
36-40	36-40 "	550 "	4 "	4 "	7 1/4 x 8
40-50	40-50 "	400 "	4 "	4 "	5 1/4 x 6
60-70	60-70 "	400 "	4 "	6 "	7 1/4 x 8

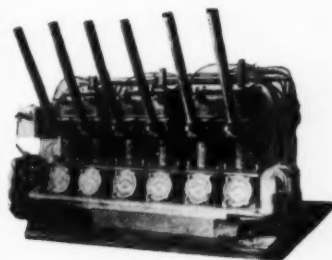
Oriole.

PAGE ENGINEERING CO., BALTIMORE, MD.

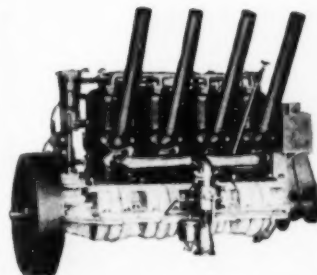
Model	5 h.p.	475 r.p.m.	2 cycle	1 cyl.	Inches.
1012	5 "	475 "	2 "	1 "	4 1/4 x 5
"	7 "	450 "	2 "	1 "	4 1/4 x 6 1/2
"	8 1/2 "	425 "	2 "	1 "	6 1/4 x 6 1/2
"	10 "	475 "	2 "	2 "	4 1/4 x 5
"	14 "	450 "	2 "	2 "	5 1/4 x 6 1/2
"	17 "	425 "	2 "	2 "	6 1/4 x 6 1/2



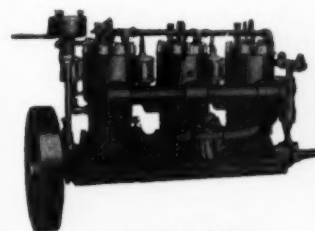
A Whitehall Six.



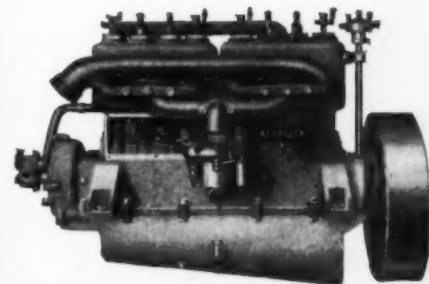
48-H.P. Willet Six.



Wisconsin models G and H.



9-H.P. Wonder.



The Kermath motor of the Morton Motor Company.

Palmer.

PALMER BROS., COS COB, CONN.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
B	1 1/2	500	2	1	3 1/2 x 3 1/2
C	3	400	2	1	4 1/2 x 4 1/2
D	5	400	2	1	5 x 6
E	7 1/2	400	2	1	6 x 6
U ₁	2	600	2	1	3 1/4 x 3 1/4
U ₂	5	600	2	2	3 1/4 x 3 1/4
S ₁	3 1/2	500	2	1	4 1/2 x 4 1/2
S ₂	8	500	2	2	4 1/2 x 4 1/2
T ₁	5 1/2	475	2	1	5 x 6
T ₂	11	475	2	1	5 x 6
O ₁	3	700	2	1	3 1/4 x 3 1/4
O ₂	6	700	2	2	3 1/4 x 3 1/4
O ₃	9	700	2	3	3 1/4 x 3 1/4
P ₁	5	650	2	1	4 1/2 x 4 1/2
P ₂	10	650	2	2	4 1/2 x 4 1/2
P ₃	15	650	2	3	4 1/2 x 4 1/2
O ₄	7	625	2	1	5 x 6
O ₅	14	625	2	2	5 x 6
O ₆	20	625	2	3	5 x 6
L ₁	3 1/2	600	4	1	4 1/2 x 4 1/2
L ₂	8	600	4	2	4 1/2 x 4 1/2
L ₃	14	600	4	4	5 1/2 x 4 1/2
M ₁	5	600	4	1	5 x 6
M ₂	10	600	4	2	5 x 6
M ₃	18	600	4	4	5 x 6
R ₁	5	600	4	1	5 x 6
R ₂	15	600	4	2	5 x 6
R ₃	20	600	4	3	5 x 6
K ₂	30-25	350	4	2	7 1/2 x 10
K ₃	30-35	300	4	3	7 1/2 x 10

Hercules and Peerless.

PEERLESS MOTOR CO., LANSING, MICH.

Hercules	3 1/2-75 h.p.	350-500 r.p.m.	4 cycle	1-4 cyl.
Peerless	2-12 "	300-500 "	4 "	1 "

Globe.

PENNSYLVANIA IRON WORKS CO., EDDYSTONE, PA.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
E Heavy Duty	16	360	4	2	7 x 9
F	25	350	4	2	8 1/2 x 10
S	30	350	4	2	7 1/2 x 9
G	35	320	4	4	7 x 10
H	30	320	4	4	8 1/2 x 10
I	90	280	4	4	10 x 14
J	110	280	4	4	11 x 14
K	30	335	4	3	7 1/2 x 9
S-3	40	325	4	4	7 1/2 x 9
T-3 Med. Duty	60-70	320-380	4	3	10 x 10
T-4	80-92	320-380	4	4	10 x 10
Z-1	6-8	550-650	2	1	5 1/2 x 5
Z-2	12-16	550-650	2	2	5 1/2 x 5
Z-3	18-24	550-650	2	3	5 1/2 x 5
Z-4	24-32	550-650	2	4	5 1/2 x 5
Z-6	36-48	550-650	2	6	5 1/2 x 5

Phillips Duplex Governed Marine Motor.

PHILLIPS GASOLINE AND MOTOR CO., CHICAGO, ILL.

Duplex	8-10 h.p.	300-1000 r.p.m.	4 cycle	2 cyl.	4 1/2 x 4
Governed	16-20 "	300-1000 "	4 "	4 "	4 1/2 x 4
Quadruplex					

Can be used with gasoline distillate, kerosene, alcohol.

Pierce-Budd.

PIERCE BUDD CO., BAY CITY, MICH.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
1	4-6	1000	2	1	4 x 4
2	12-15	1200	2	2	4 x 4
3	18-25	1600	2	3	4 x 4
4	60-60	2000	2	6	4 x 4
5	200	1200	2	6	6 1/2 x 7

Porter.

PORTER ENGINE AND MACHINE CO., YORK, PA.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
B	5	100	4	1	4 1/2 x 5
C	10	100	4	2	4 1/2 x 5
D	15	100	4	3	4 1/2 x 5
E	20	100	4	4	4 1/2 x 5
F	40	400	4	4	6 1/2 x 9

Puritan.

PURITAN ENGINE & BOAT CO., BOSTON, MASS.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
A-2	1 1/2-2	550-650	2	1	3 1/4 x 3
A-3	3-4	550-650	2	1	4 x 4
A-5	5-6	550-650	2	1	4 1/2 x 5
B-6	6-8	550-650	2	1	4 x 4
B-10	10-12	550-650	2	2	4 1/2 x 5
C-9	9-12	550-650	2	3	4 x 4
C-15	15-18	550-650	2	3	4 1/2 x 5

Red Wing.

RED WING MOTOR CO., RED WING, MINN.

P	16 h.p.	1500 r.p.m.	2 cycle	2 cyl.	5 x 5
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Regal.

REGAL GASOLINE ENGINE CO., COLDWATER, MICH.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
High Speed	3	700	4	1	4 x 4 1/2
"	4	700	4	1	4 x 4 1/2
"	6	700	4	2	4 x 4 1/2
"	8	700	4	2	4 1/2 x 4 1/2
"	12	700	4	4	4 x 4 1/2
"	16	700	4	4	4 1/2 x 4 1/2
Medium Duty	5	500	4	1	3 1/2 x 3 1/2
"	10	500	4	2	3 1/2 x 3 1/2
"	24	600	4	4	3 1/2 x 5 1/2
Heavy Duty	7	400	4	1	6 1/2 x 7
"	14	400	4	2	6 1/2 x 7
"	28	400	4	4	6 1/2 x 7
"	45	400	4	4	7 1/2 x 9
Automobile Marine	32	1000	4	4	4 1/2 x 5 1/2

Used with gasoline or kerosene.

Reynolds Rotary Valve.

REYNOLDS MOTOR CO., DETROIT, MICH.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
1	15-20	750-1000	4	4	3 1/2 x 4 1/2
2	20-30	650-1000	4	4	4 1/2 x 6
3	30-45	650-1000	4	6	4 1/2 x 6

These last two motors are in course of construction, to be on the market this winter.

Roberts.

THE ROBERTS MOTOR CO., SANDUSKY, OHIO.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
0	3	900	2	1	3 1/2 x 3
2-O	6	900	2	2	3 1/2 x 3
2-M	10	900	2	2	4 x 3 1/2
3-M	15	900	2	3	4 x 3 1/2
4-M	20	900	2	4	4 x 3 1/2
2-P	20	1000	2	2	4 1/2 x 5
3-P	30	1000	2	3	4 1/2 x 5
4-P	40	1000	2	4	4 1/2 x 5
5-P	60	1000	2	6	4 1/2 x 5
Big Six	125-150	12-1400	2	6	5 1/2 x 6

Rochester.

ROCHESTER GAS ENGINE CO., ROCHESTER, N. Y.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
B	4	800	2	1	3 1/2 x 3 1/2
D	8	700	2	1	4 1/2 x 5
E	8	800	2	2	3 1/2 x 3 1/2
F	12	800	2	2	3 1/2 x 3 1/2
G	16	700	2	2	4 1/2 x 5
H	16	800	2	4	3 1/2 x 3 1/2
I	24	700	2	3	4 1/2 x 5
L	24	800	2	6	3 1/2 x 3 1/2
K	32	700	2	4	4 1/2 x 5
	48	700	2	6	4 1/2 x 5

Continental.

THE RELIANCE MOTOR BOAT CO., NEW YORK CITY.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
J	40	1000-1200	4	4	5 x 5
R	24	1000-1200	4	4	4 1/2 x 4 1/2

Remington Oil Engine.

REMINGTON OIL ENGINE CO., STAMFORD, CONN.

15 AM ₄	75 h.p.	400 r.p.m.	2 cycle	4 cyl.	8 1/2 x 8
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Used with kerosene and fuel oil.

Sagamore.

SAGAMORE ENGINE CO., INC., WEST LYNN, MASS.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
1	3	700	2	1	4 x 4
2	5	550	2	1	4 1/2 x 5
3	6	550	2	1	4 1/2 x 5
4	7 1/2	500	2	1	5 1/2 x 5 1/2
5	12	400	2	1	7 x 7
6	20	400	2	1	8 x 7 1/2
7	6	700	2	2	4 x 4
8	10	550	2	2	4 1/2 x 5
9	12	550	2	2	4 1/2 x 5
10	15	500	2	2	5 1/2 x 5 1/2
11	24	425	2	2	7 x 7
12	40	425	2	2	8 x 7 1/2
13	25	1000	2	2	4 x 5
14	50	1000	2	4	4 x 5

The last two motors are special open base, high speed.

Schlosser.

SCHLOSSER MFG. CO., NEW YORK CITY.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
E	40	1000	4	4	5 x 6
D	30	1000	4	4	4 1/2 x 5
H	48	1000	4	4	5 1/2 x 6

Schaefer.

SCHAEFER MANUFACTURING CO., BERLIN, WIS.

14	20 h.p.	600 r.p.m.	4 cycle	4 cyl.	5 x 5
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Scripps.

SCRIPPS MOTOR CO., DETROIT, MICH.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
A	4 1/2-6	600-800	4	1	4 1/2 x 5
B	7-9	500-700	4	1	5 1/2 x 6
M	9-13	600-800	4	2	4 1/2 x 5
L	12-18	450-700	4	2	4 1/2 x 6
H	18-30	600-1000	4	4	4 1/2 x 5
K	24-48	450-1000	4	4	5 1/2 x 6
E	27-45	600-1000	4	6	4 1/2 x 5
O	48-72	600-1000	4	6	5 1/2 x 6
G	70	1100	4	4	6 1/2 x 6
R	105	1100	4	6	6 1/2 x 6
Heavy Duty	32	450	4	2	7 1/2 x 9
"	64	450	4	4	7 1/2 x 9
"	96	450	4	6	7 1/2 x 9

K. & D.

SENECA FALLS ENGINE & SUPPLY CO., SENECA FALLS, N. Y.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
1	5	200-600	2	1	4 1/2 x 4
2	10	200-600	2	2	4 1/2 x 4
3	15	200-600	2	3	4 1/2 x 4

The Little Skipper.

SKIPPER MARINE ENGINE CO., CINCINNATI, OHIO.

Model	h.p.	r.p.m.	cycle	cyl.	Inches.
1	3	750	2	1	3 1/2 x 2 1/2
2	4	750	2	1	4 1/2 x 3 1/2
3	6	750	2	1	4 1/2 x 3 1/2

Used with gasoline or kerosene.

Wat.

LAUTH AUTO & ENGINE CO., PORT HURON, MICH.

		h.p.	800 r.p.m.	2 cycle	1 cyl.	Inches.
A	2	"	"	"	"	3 x 3 1/2
B	4	"	"	"	"	3 x 3 1/2
C	4 1/2	"	"	"	"	4 x 4
D	9	"	"	"	"	4 x 4
E	7	"	"	"	"	5 x 5
F	14	"	"	"	"	5 x 5

Sparks.

SPARKS BOAT AND ENGINE CO., ALTON, ILL.

		h.p.	600 r.p.m.	4 cycle	Cylinder.	Inches.
1	5	"	"	"	1 vertical	4 1/2 x 5
2	7	"	"	"	2 opposed	4 x 4
3	10	"	"	"	2 vertical	4 1/2 x 5
4	14	"	"	"	2 opposed	5 x 5
5	20-24	"	"	"	4 vertical	4 1/2 x 5

Spaulding.

THE SPAULDING ENGINE CO., ST. JOSEPH, MICH.

		h.p.	600 r.p.m.	2 cycle	1 cyl.	Inches.
B	5	"	"	"	"	4 1/2 x 4 1/2
C	7 1/2	"	"	"	"	5 1/2 x 5 1/2
D	10	"	"	"	"	6 1/2 x 6 1/2
BB	10	"	"	"	"	4 1/2 x 4 1/2
CC	15	"	"	"	"	5 1/2 x 5 1/2
DD	20	"	"	"	"	6 1/2 x 6 1/2

Standard.

STANDARD MOTOR CONSTRUCTION CO., JERSEY CITY, N. J.

		h.p.	400 r.p.m.	4 cycle	2 cyl.	Inches.
Heavy Duty	8-10	"	"	"	"	5 x 6 1/2
"	12-16	"	"	"	"	6 x 8
"	16-20	"	"	"	"	5 x 6 1/2
"	18-24	"	"	"	"	6 x 8
Auto-Marine	25	"	"	"	"	4 x 5 1/2
Heavy Duty	25-32	"	"	"	"	6 x 8
Auto-Marine	37	"	"	"	"	4 x 5 1/2
Heavy Duty	40-50	"	"	"	"	6 x 8
"	50-65	"	"	"	"	8 x 10
"	75-90	"	"	"	"	8 x 10
Auto-Marine	60	"	"	"	"	6 x 6 1/2
Heavy Duty	100-125	"	"	"	"	8 1/2 x 11
"	300	"	"	"	"	12 x 14
"	300	"	"	"	"	10 x 10 1/2
"	300	"	"	"	"	12 1/2 x 13
"	1000	"	"	"	"	16 x 16

Sterling.

STERLING ENGINE CO., BUFFALO, N. Y.

		h.p.	4 cycle	4 cyl.	Inches.
B	18-25	"	"	"	4 1/2 x 5 1/2
BB	25-40	"	"	"	4 1/2 x 5 1/2
B	30-45	"	"	"	5 1/2 x 6
B	35-55	"	"	"	4 1/2 x 5 1/2
B	45-65	"	"	"	5 1/2 x 6
B	100	"	"	"	5 1/2 x 6
C	8-10	"	"	"	4 1/2 x 6
C	12-15	"	"	"	5 1/2 x 7
D	20	"	"	"	6 1/2 x 8
D	40	"	"	"	6 1/2 x 8
D	60	"	"	"	6 1/2 x 8
Special Racer	130-140	"	"	"	5 1/2 x 6 1/2
Special Heavy Duty	25-35	"	"	"	5 1/2 x 8

Stuart Engine.

JOHN STUART COMPANY, WOLLASTON, MASS.

		h.p.	500-800 r.p.m.	2 cycle	1 cyl.	Inches.
Stuart	4-6	"	"	"	"	4 x 5
"	8-12	"	"	"	"	4 x 5
"	16-24	"	"	"	"	4 x 5
"	15	"	"	"	"	5 1/2 x 6
"	30	"	"	"	"	5 1/2 x 6
"	48	"	"	"	"	5 1/2 x 6

Teel.

TEEL MOTOR CO., EAST BOSTON, MASS.

		h.p.	700 r.p.m.	4 cycle	4-6 cyl.	Inches.
N	35	"	"	"	"	5 1/2 x 7
K	20	"	"	"	"	5 x 5
L	16	"	"	"	"	4 1/2 x 4 1/2
M	10-12	"	"	"	"	5 1/2 x 6 1/2
A	12	"	"	"	"	5 1/2 x 6 1/2

T. and M.

TERMAAT & MONAHAN CO., OSHKOSH, WIS.

		h.p.	650 r.p.m.	2 cycle	1 cyl.	Inches.
A	3	"	"	"	"	3 1/2 x 3 1/2
A	5	"	"	"	"	4 1/2 x 4 1/2
A	8	"	"	"	"	4 x 4
A	12	"	"	"	"	4 1/2 x 4 1/2
A	20	"	"	"	"	5 1/2 x 6
B	10	"	"	"	"	4 x 4
B	18	"	"	"	"	5 x 4 1/2
F	24	"	"	"	"	7 x 8
F	36	"	"	"	"	7 x 8
F	48	"	"	"	"	7 x 8

Used with gasoline or kerosene.

Thelma.

THELMA MOTOR WORKS, DETROIT, MICH.

		h.p.	1200 r.p.m.	4 cycle	4 cyl.	Inches.
4 cyl.	35	"	"	"	"	5 1/2 x 5 1/2
6 "	70	"	"	"	"	5 1/2 x 5 1/2

Toppan.

TOPPAN BOAT MFG. CO., BOSTON, MASS.

		h.p.	200-700 r.p.m.	2 cycle	1-2 cyl.	Inches.
Toppan	2	"	"	"	"	3 x 3 1/2
"	3	"	"	"	"	3 1/2 x 3 1/2
"	5	"	"	"	"	4 1/2 x 4 1/2
"	8	"	"	"	"	4 x 4
"	12	"	"	"	"	4 1/2 x 4 1/2

Trebert.

TREBERT GAS ENGINE CO., TERRE HAUTE, IND.

		h.p.	125-1200 r.p.m.	4 cycle	2 cyl.	Inches.
Model 1	10	"	"	"	"	4 1/2 x 5
"	25	"	"	"	"	4 1/2 x 5
"	35	"	"	"	"	5 x 6
"	51	"	"	"	"	5 x 4 1/2
Canoe	1	"	"	"	"	2 1/2 x 2
"	2	"	"	"	"	2 1/2 x 2
"	3	"	"	"	"	2 1/2 x 2

Trebert Reliance.

H. L. F. TREBERT ENGINE WORKS, ROCHESTER, N. Y.

		h.p.	1000 r.p.m.	4 cycle	4 cyl.	Inches.
4/40	25-40	"	"	"	"	4 1/2 x 5 1/2
6/60	40-60	"	"	"	"	4 1/2 x 5 1/2
4/60	40-60	"	"	"	"	6 x 6 1/2
6/90	60-90	"	"	"	"	6 x 6 1/2
4/90	60-90	"	"	"	"	6 1/2 x 8
Racing	40	"	"	"	"	4 1/2 x 5
"V"	80	"	"	"	"	4 1/2 x 5
Aeroplane	50	"	"	"	"	4 " Wgt. 200 lbs.
Revolving						
Type						

Reeves-Graef.

TRENTON ENGINE CO., TRENTON, N. J.

		h.p.	375 r.p.m.	4 cycle	2-4 cyl.	Inches.
G	15-50	"	"	"	"	6 1/2 x 8 1/2
L	75-125	"	"	"	"	10 x 14

Tuttle.

TUTTLE MOTOR CO., CANASTOTA, N. Y.

		h.p.	900 r.p.m.	2 cycle	1 cyl.	Inches.
L	2	"	"	"	"	3 1/2 x 3
2L	4	"	"	"	"	3 1/2 x 3
3L	6	"	"	"	"	3 1/2 x 3
N	5	"	"	"	"	4 1/2 x 4
2N	10	"	"	"	"	4 1/2 x 4
3N	15	"	"	"	"	4 1/2 x 4
T	10	"	"	"	"	6 x 5 1/2
2T	20	"	"	"	"	6 x 5 1/2
3T	30	"	"	"	"	6 x 5 1/2
2X	18-20	"	"	"	"	4 1/2 x 4 1/2
4X	30-40	"	"	"	"	4 1/2 x 4 1/2

Toledo.

UNIVERSAL MACHINE CO., BOWLING GREEN, O.

		h.p.	750 r.p.m.	2 cycle	1 cyl.	Inches.
1	3	"	"	"	"	3 1/2 x 3 1/2
2	6	"	"	"	"	3 1/2 x 3 1/2
3	6	"	"	"	"	4 1/2 x 4 1/2
4	12	"	"	"	"	4 1/2 x 4 1/2
5	18	"	"	"	"	4 1/2 x 4 1/2

Valentine.

F. J. VALENTINE, -JFFALO, N. Y.

		h.p.	800 r.p.m.	2 cycle	1 cyl.	Inches.
A	2 1/2	"	"	"	"	3 1/2 x 3
B	5	"	"	"	"	3 1/2 x 3
C	10	"	"	"	"	3 9/16 x 3

Faultless.

VALLEY BOAT & ENGINE CO., SAGINAW, MICH.

		h.p.	850 r.p.m.	2 cycle	1 cyl.	Inches.
Faultless	3 1/2	"	"	"	"	3 1/2 x 3 1/2
"	5	"	"	"	"	4 x 4
"	7	"	"	"	"	3 1/2 x 3 1/2
"	10	"	"	"	"	4 x 4
"	16	"	"	"	"	5 x 5
"	15	"	"	"	"	4 x 4
"	25	"	"	"	"	5 x 5

Van-Blerck.

VAN-BLECK MOTOR CO., DETROIT, MICH.

		h.p.	650 r.p.m.	4 cycle	2 cyl.	Inches.
B	12-15	"	"	"	"	5 x 6
C	25-35	"	"	"	"	5 x 6
D	35-45	"	"	"	"	5 x 6
E	40-60	"	"	"	"	5 1/2 x 6
F	60-80	"	"	"	"	5 1/2 x 6
F Special	90	"	"	"	"	5 1/2 x 6
Special	100-140	"	"	"	"	5 1/2 x 6

Vanguard.

VANGUARD ENGINE CO., BOSTON, MASS.

		h.p.	550-700 r.p.m.	2 cycle	1 cyl.	Inches.
1	4-5	"	"	"	"	3 x 3
2	8-10	"	"	"	"	3 x 3
3	12-15	"	"	"	"	3 x 3
4	16-20	"	"	"	"	4 x 4
5	25-30	"	"	"	"	4 x 4
6	35-45	"	"	"	"	5 x 6
7	50-60	"	"	"	"	5 x 6
8	75-90	"	"	"	"	5 x 6

Vim.

THE VIM MOTOR CO., SANDUSKY, OHIO.

		h.p.	800 r.p.m.	2 cycle	1 cyl.	Inches.
1	3	"	"	"	"	3 1/2 x 3 1/2
2	6	"	"	"	"	3 1/2 x 3 1/2
3	10	"	"	"	"	4 x 4
4	15	"	"	"	"	4 x 4
5	20	"	"	"	"	4 x 4
6	25	"	"	"	"	4 x 4
7	30	"	"	"	"	4 x 4
8	35	"	"	"	"	4 x 4
9	40	"	"	"	"	4 x 4
10	45	"	"	"	"	4 x 4
11	50	"	"	"	"	4 x 4
12	55	"	"	"	"	4 x 4
13	60	"	"	"	"	4 x 4
14	65	"	"	"	"	4 x 4
15	70	"	"	"	"	4 x 4
16	75	"	"	"	"	4 x 4
17	80	"	"	"	"	4 x 4
18	85	"	"	"	"	4 x 4
19	90	"	"	"	"	4 x 4
20	95	"	"	"	"	4 x 4

Vulcan.

VULCAN ENGINE WORKS, PHILADELPHIA, Pa.

		h.p.	4 cycle	1 cyl.	Inches.
1	4	"	"	"	4 1/2 x 6
2	5	"	"	"	4 1/2 x 6
3	6	"	"	"	4 1/2 x 6
4	7	"	"	"	4 1/2 x 6
5	8	"	"	"	4 1/2 x 6
6	9	"	"	"	4 1/2 x 6
7	10	"	"	"	4 1/2 x 6
8	11	"	"	"	4 1/2 x 6
9	12	"	"	"	4 1/2 x 6
10	13	"	"	"	4 1/2 x 6
11	14	"	"	"	4 1/2 x 6

Waterman.

WATERMAN MARINE MOTOR CO., DETROIT, MICH.

		h.p.	850 r.p.m.	2 cycle	1 cyl.	Inches.
Outboard	2	"	"	"	"	2 1/4 x 3
K-1	2	"	"	"	"	2 1/4 x 3
K-2	2	"	"	"	"	2 1/4 x 3
K-3	2	"	"	"	"	2 1/4 x 3
K-4	2	"	"	"	"	2 1/4 x 3
A-4	4	"	"	"	"	4 x 4
A-6	6	"	"	"	"	4 x 4 1/2
A-10	10	"	"	"	"	4 1/2 x 4
A-15	15	"	"	"	"	4 1/2 x 4
A-25	25	"	"	"	"	4 1/2 x 4
B-1	4	"	"	"	"	4 x 4
B-2	8	"	"	"	"	4 x 4
B-4	22	"	"	"	"	4 x 4

Watertown.

WATERTOWN MOTOR CO., WATERTOWN, N. Y.

		h.p.	750 r.p.m.	2 cycle	1 cyl.	Inches.
3 Port S	3	"	"	"	"	3 1/2 x 3 1/2
3 " S	5	"	"	"	"	3 1/2 x 3 1/2
3 " S	8	"	"	"	"	3 1/2 x 3 1/2
3 " S	12	"	"	"	"	3 1/2 x 3 1/2
3 " S	16	"	"	"	"	3 1/2 x 3 1/2
2 & 3 Port R	20	"	"	"	"	3 1/2 x 3 1/2
2 & 3 Light	20	"	"	"	"	3 1/2 x 3 1/2
Weight	16	"	"	"	"	4 1/2 x 4
"	36	"	"	"	"	4 1/2 x 4
"	60	"	"	"	"	4 1/2 x 4
3 Port S	12	"	"	"	"	5 x 5
3 " S	18	"	"	"	"	5 x 5
3 " S	24	"	"	"	"	5 x 5
2 & 3 Port, Light	40	"	"	"	"	5 1/2 x 5
Weight	60	"	"	"	"	5 1/2 x 5

Wayne Motor.

THE WAYNE MOTOR CO., DETROIT, MICH.

		h.p.	500 r.p.m.	2 cycle	2 cyl.	Inches.
2-8	8	"	"	"	"	4 x 4
1-4	4	"	"	"	"	4 x 4

Rutenber.

WESTERN MOTOR CO., MARION, IND.

		h.p.	900 r.p.m.	4 cycle	4 cyl.	Inches.
Ra	25	"	"	"	"	4 1/2 x 5
U	30	"	"	"	"	4 1/2 x 5
W	15	"	"	"	"	4 x 4

Whitehall.

THE WHITEHALL MOTOR & BOAT CO., WHITEHALL, N. Y.

		h.p.	700 r.p.m.	2 cycle	1 cyl.	Inches.
A	3	"	"	"	"	3 9/16 x 4
A	7	"	"	"	"	3 9/16 x 4
A	10	"	"	"	"	3 9/16 x 4
A	15	"	"	"	"	3 9/16 x 4
A	20	"	"	"	"	3 9/16 x 4
B	5	"	"	"	"	4 1/2 x 4 1/2
B	12	"	"	"	"	4 1/2 x 4 1/2
B	18	"	"	"	"	4 1/2 x 4 1/2
B	23	"	"	"	"	4 1/2 x 4 1/2
B	40	"	"	"	"	4 1/2 x 4 1/2
D	20	"	"	"	"	5 x 5
D	60	"	"	"	"	5 x 5
D	100	"	"	"	"	5 1/2 x 5 1/2
D	150	"	"	"	"	5 1/2 x 5 1/2

Willet Perfected Two-Cycle.

WILLET ENGINE CO., BUFFALO, NEW YORK.

		h.p.	800 r.p.m.	2 cycle	1 cyl.	Inches.
A	8	"	"	"	"	4 1/2 x 5 1/2
B	16	"	"	"	"	4 1/2 x 5 1/2
C	24	"	"	"	"	4 1/2 x 5 1/2
D	32	"	"	"	"	4 1/2 x 5 1/2
E	48-60	"	"	"	"	4 1/2 x 5 1/2

May be used with gasoline or kerosene.

Wisconsin Valveless.

WISCONSIN MACHINERY & MFG. CO., MILWAUKEE, WIS.

		h.p.	700 r.p.m.	2 cycle	1 cyl.	Inches.
A	5	"	"	"	"	4 x 4
B	7	"	"	"	"	4 1/2 x 4 1/2
C	10	"	"	"	"	4 x 4
D	15	"	"	"	"	4 1/2 x 4 1/2
E	20	"	"	"	"	4 x 4
F	27	"	"	"	"	4 1/2 x 4 1/2
G	30	"	"	"	"	4 x 4
H	40	"	"	"	"	4 1/2 x 4 1/2
I	45	"	"	"	"	4 x 4
J	60	"	"	"	"	3 1/2 x 4 1/2
K	40	"	"	"	"	6 x 7

Wolverine.

WOLVERINE MOTOR WORKS, BRIDGEPORT, CONN.

		h.p.	500 r.p.m.	4 cycle	1 cyl.	Inches.
Junior	5	"	"	"	"	5 1/2 x 6
Wolverine	12	"	"	"	"	6 1/2 x 7
"	18	"	"	"	"	6 1/2 x 7
"	27	"	"	"	"	7 1/2 x 9
"	36	"	"	"	"	8 1/2 x 9
"	50	"	"	"	"	9 1/2 x 12
"	65	"	"	"	"	10 x 12
"	75	"	"	"	"	11 x 12
"	100	"	"	"	"	12 1/2 x 14

Used with gasoline, kerosene, distillate, alcohol or producer gas.

Wonder.

WONDER MFG. CO., SYRACUSE, N. Y.

		h.p.	850 r.p.m.	2 cycle	2 cyl.	Inches.
1	10	"	"	"	"	4 x 3 1/2
9	"	"	"	"	"	"

More models.

Weco.

C. T. WRIGHT ENGINE CO., GREENVILLE, MICH.

		h.p.	975 r.p.m.	2 cycle	1 cyl.	Inches.
A	3-3 1/2	"	"	"	"	3 1/2 x 3 1/2
B	4	"	"	"	"	3 1/2 x 3 1/2
C	6-7 1/2	"	"	"	"	3 1/2 x 3 1/2
D	9-10 1/2	"	"	"	"	3 1/2 x 3 1/2
E	12-14	"	"	"	"	3 1/2 x 3 1/2
F	5-6	"	"	"	"	4 x 4
G	10-12	"	"	"	"	4 x 4
H	15-18	"	"	"	"	5 x 5
I	30-35	"	"	"	"	7 x 7
J	60-70	"	"	"	"	7 x 7

Xargil

XARGIL MFG. CO., UTICA, N. Y.

		h.p.	600 r.p.m.	2 cycle	1 cyl.	Inches.
1	4 1/2	"	"	"	"	4 1/2 x 5 1/2
2	10-12	"	"	"	"	4 1/2 x 5 1/2
3	20	"	"	"	"	4 1/2 x 5 1/2

Lathrop.

J. W. LATHROP & COMPANY, MYSTIC, CONN.

		h.p.	500 r.p.m.	2 cycle	1 cyl.	Inches.
Model	3	"	"	"	"	4 x 4
1	4	"	"	"	"	4 1/2 x 5
2	5	"	"	"	"	5 3/16 x 5
Light Model	6	"	"	"	"	5 1/2 x 5
Standard	6	"	"	"	"	5 1/2 x 5
Model	6	"	"	"	"	5 1/2 x 5
6	7	"	"	"	"	5 1/2 x 5
7	8	"	"	"	"	5 1/2 x 5
8	10	"	"	"	"	5 1/2 x 5
9	12	"	"	"	"	5 1/2 x 5
10	8	"	"	"	"	5 1/2 x 5
11	10	"	"	"	"	5 1/2 x 5
Light Model	12	"	"	"	"	5 1/2 x 5
Standard	12	"	"	"	"	5 1/2 x 5
Model	12	"	"	"	"	5 1/2 x 5
14	14	"	"	"	"	5 1/2 x 5
15	16	"	"	"	"	5 1/2 x 5
16	20	"	"	"	"	5 1/2 x 5
17	24	"	"	"	"	5 1/2 x 5

Kermath.

MORTON MOTOR COMPANY, DETROIT, MICH.

		h.p.	800-1000 r.p.m.	4 cycle	4 cyl.	Inches.
One only	10-12	"	"	"	"	3 1/2 x 4

Marine Diesel Engine Builders.

The Names and Addresses of British and European Firms Manufacturing Marine Engines of the Oil Burning, Diesel Type.

AS WILL have been gleaned by recent articles published in MoToR Boating the development of the marine Diesel type engine has made great progress during the past year in Europe, and a large number of British and Continental engineering firms have lately acquired licenses from Dr. Diesel, the M.A.N., Carl Freres, or have commenced operations on their own systems. Although both four-cycle and two-cycle type Diesel engines are constructed, the majority of firms have adopted the two-cycle system, while Sulzer Bros., and Krupps are turning out both classes. The M.A.N. of Nuremberg have divided their engines into four series, namely: *Class A*.—The two-cycle, single-acting light-weight fast-running engines for naval purposes. Powers standardized, 150 to 4,000 h.p. *Class B*.—The two-cycle, single-acting heavy-duty engines, for moderate size cargo, and passenger ships. Powers standardized, 180 to 2,000 h.p. *Class C*.—The two-cycle double-acting lightweight high-speed engines for destroyers and scouts. *Class D*.—The two-cycle double-acting heavy-duty engines for large mercantile ships, liners and small naval cruisers. Powers, up to 6,000 h.p.; all engines are reversible. If required Class B can be

built in higher powers, but they are not standardized. The firm has over 30,000 h.p. actually on order. We have endeavored to secure a complete list of marine Diesel engine manufacturers as follows:

Great Britain.

Swan, Hunter & Wigham Richardson, Ltd., Neptune Works, W. Newcastle-on-Tyne.
Babcock & Wilcox, Ltd., Oriol House, Farringdon Street, London, E. C.
J. Samuel White & Co., Cowes, Isle of Wight, Hants.
Vickers Ltd., Barrow-in-Furness.
J. I. Thornycroft & Co., Ltd., Caxton House, Westminster, London, S. W.
The Diesel Engine Co., 179, Queen Victoria Street, London, E. C.
Willans & Robinson, Ltd., Rugby.
Barclay-Curle, Ltd., Whiteinch, Glasgow.
Yarrow & Co., Scotstoun, Glasgow.
Cammell, Laird & Co., Ltd., Glasgow.
Harland & Wolff, Glasgow.
Richardson, Westgarth, Ltd., Middlesborough.
Brazil Straker & Co., Ltd., Vulcan Ironworks, Bristol.
The Fairfield Shipbuilding & Engineering Co., Govan, Glasgow.
Sir W. G. Armstrong, Whitworth & Co., Ltd., Newcastle-on-Tyne.
Clyde Shipbuilding & Engineering Co., Ltd., Glasgow.
Palmer Bros., Jarrow.
Westinghouse Brake Co., London.

Germany.

Fried. Krupp, Germania Werft, Kiel-Gaarden.
Machinenfabrik Augsburg, Nurnburg, Nuremberg.
Actiengesellschaft Weser, Bremen.
Reschertig Schiffbau, A. G., Kiel.

France.

Chantiers & Ateliers, Augustin Normand, 67 Rue de Perrey, Havre.
Schneider et Cie., Paris and Cruesot.
Société des Moteurs Sabathé, St. Etienne.
Société Anonyme des Ateliers et Chantiers de la Loire, St. Denis.

Netherlands.

Nederlandsche Fabriek Van Wertuigen en Spoorweg Materieel, Amsterdam.
Carl Freres, Ghent.
Blohm & Voss, Hamburg.
Société John Cockerill, Hoboken, near Antwerp.

Russia.

Société Anon Chantiers Navals Atelier et Foundiers de Nicolief, Nicolief.
Kolonnaer Machinenfabrik, Kolonna, near Moscow.
Nobel Bros., Usines, St. Petersburg.

Italy.

Fabrica Italiana Automobili Torino, Turin.
Ind. Paolo Kind, Turin.

America.

New London Ship & Engine Co., Groton, Conn.

Switzerland.

Sulzer Bros., Winterthur, near Zurich.

Sweden.

Aktiebolaget Diesels Motorer, Stockholm.

Denmark.

Burmeister & Wien, Copenhagen.

Motor Boat Accessories.

On this and the following five pages appear the descriptions and illustrations of accessories for the motor boat and its power plant. In this department we have endeavored to include representative devices of the manufacturers in this field, although it has, of course, been

impossible to consider all the products of each manufacturer. In compiling this matter, we have tried to include all the newest devices, but have not restricted the department to one composed entirely of the newest things on the market.—EDITOR.

Sanborn Marine Speedometer.

The Sanborn Marine Speedometer, manufactured by the American Steam Gauge & Valve Mfg. Co., of Boston, and is designed to show the speed of the boat at any time. The outfit consists of two principal parts, a speedometer gauge shown in the accompanying illustration and an inlet cut-water which is placed underneath the boat so that the varying pressure upon it caused by the speed with which the boat is traveling through the water, is indicated upon the dial. A special feature of the device is the protection afforded by a triangular shaped plate which extends in front of the inlet tube so that seaweed, grass or floating material will be warded off. A cleaning wire is also provided which remains in the inlet tube and has an adjustable handle which fixes it in position and allows the wire to be forced out through the tube thus removing any small particles that may have obstructed the inlet. This instrument is particularly useful, since the exact speed of the boat in relation to the water through which it is passing may be read at any time. The device is easily attached and cannot in any way cause the boat to leak.

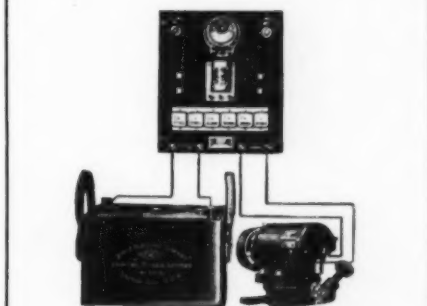
Aplco Electric System.

The model B-2 system of electric lighting for boats made by the Apple Electric Co., of Dayton, Ohio, which is shown in the accompanying illustration, is designed for boats from 25 to 40 feet in length and furnishes in addition to the ignition spark sufficient power to light lamps aggregating 60 candlepower as follows: A 4-candlepower bow light, two 6 c.p. running lights, a 6-candlepower riding light and a 20 c.p. searchlight. This leaves 18 c.p. available for cabin lights or 38 c.p. when the searchlight is not in use. This is the medium sized system, the smaller model being for boats from 16 to 25 ft. in length, and the larger system for boat up to 65 ft. It consists of a 10-ampere plain bearing dynamo equipped with an adjustable spring base and a friction for belt pulley, a 6-volt, 100-ampere hour storage bat-

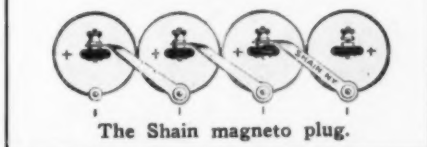


The Sanborn marine speedometer.

The Crescent wrench.



The Aplco Model B-2 outfit.



The Shain magneto plug.

tery and a switchboard. Lamps are made for all purposes and the system is very useful in addition to the regular equipment for lighting an extension hand lamp which may be used in any place desired. The price of the complete system is \$110.00, the smaller and larger one being \$67.50 and \$227.50 respectively.

Crescent Adjustable Wrench.

The wrench shown in the accompanying cut is made by the Crescent Tool Co., of Jamestown, N. Y., and is drop-forged from steel. The movable jaw has a good bearing service in the handle and when in use it has a tendency to lock itself on the handle, thereby relieving the strain on the thumb-screw. The braces to the jaw secure the greatest possible strength and form an opening to fit a hexagon nut. A small spring washer acts with slight friction on the thumb-screw to retain the adjustment of the wrench in case it should be thrown carelessly upon the bench or floor. The steel from which the wrench is made is a special alloy which is said to show about four times the strength of ordinary steel and the entire wrench is carbon hardened, and oiled and tempered. The wrench is neatly finished, the polished ones being polished all over excepting the web in the handle. The nickel-finished styles are heavily nickel-plated, and buffed with the web of handle a dull satin nickel. The prices range from 80¢ to \$2.00 each.

Shain Magneto Plug.

The Shain Plug, which is made by Chas. D. Shain, 1926 Broadway, is designed particularly for use in connection with magnetos and is therefore constructed a trifle better perhaps than the ordinary type of plug which is used with a battery and gives a weaker spark. The electrode is recessed sufficiently to protect it and it is large enough to eliminate practically any chance of its becoming carbonized through use. The shell is of heavy porcelain and metal parts are of brass. It is made in half-inch metric and S. A. E. sizes and costs 60¢.

Seaman's Motor Boat Steerer.

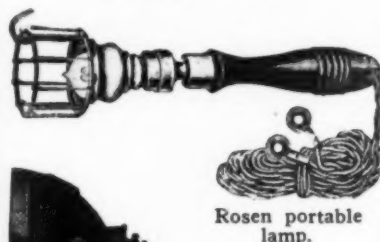
This wheel is made by the Seaman Launch and Motor Works, of Long Branch, N. J., and is suitable for launches from 20 to 50 feet in length, although an instrument for larger boats is made to order. The steerer can be adjusted to any angle or placed in any desired position upon the boat, being fastened either to the coaming or to a fore or aft bulkhead. It may also be arranged with either inside or outside controls or may be placed on the floor, under the floor or in any other position, such as under a seat or upon the motor bed or base. The gear has seven sprocket teeth, which are engaged all the time, and it has a simple and positive locking device.



The Seaman steering gear.

Electric Star Searchlight.

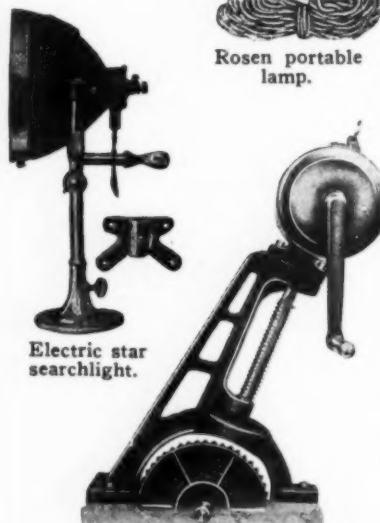
These lights are made especially for motor boat use by the Milwaukee Bronze Casting Co., of Milwaukee, and contain a swivel arrangement which permits the light to be thrown in any direction. The lamp projects a powerful white light straight ahead. The 10-inch lamp throws an intense ray for a distance of fully 1,200 feet. Lamps equipped with Mazda bulbs have a candelabra base and can be furnished in 10, 16, 20 and 25 c. p. as desired. The price ranges from \$16 to \$24, according to the size.



Rosen portable lamp.

Wilford Waterproof Cloth.

Edward A. Bunker, of New York City, is sole agent for the United States and Canada for the Wilford waterproof cloth, which is made of a twisted thread of pure flax, which renders it very strong and light. It differs from ordinary cotton cloth in the fact that it will not crack and yet is impenetrable, by either salt or fresh water. This cloth is now in use upon many grain and cargo steamers on the Great Lakes and is earning a great deal of popularity among motor boat men.



Electric star searchlight.

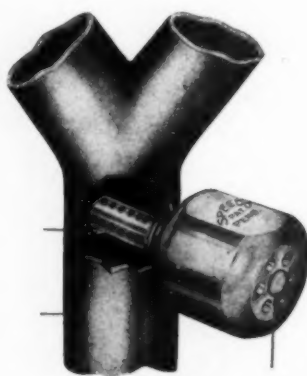
The Lombard safety starter.



Cavito underwater exhaust.

Cavito Underwater Exhaust.

The Cavito Co., of Grand Rapids, Mich., are the originators of the Cavito underwater exhaust system which is a practical and scientific method of doing away with the noise and smell of the outboard exhaust. The exhaust head is a single bronze or brass plated device comprising an exhaust nozzle extending aft, the same being tapped for a pipe at the top and increasing in sectional area and working into an outlet greater than the pipe area. The front walls of the exhaust below the boat's bottom form a deflecting plate which throws the water downward as the boat moves forward, forming a cavity into which the gases rush. A slot in the deflecting plate allows a thin sheet of water to play against the spent gases, cooling the gases and helping the exhaust to escape.



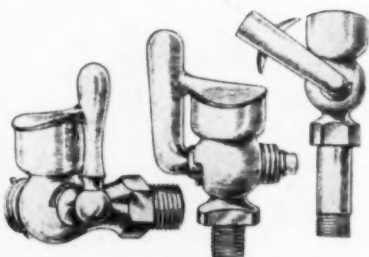
Speedo.

Hicock Name Plates.

The polished brass and nicked name plates made by the Hicock Mfg. Co., of Rochester, N. Y., are each sawed out in one piece from heavy brass, so that it stands out in relief against the background of the boat, and are very artistic and distinctive in design. There are many styles of lettering, so that one may be secured which is best adapted to the type of boat and to suit the space available. The plates are highly polished and any size required both as to height and length is furnished, giving a certain individuality which exactly suits the boat and sets it off to the best advantage.

Duryea Priming Cup.

The three priming cups shown upon this page are the product of the Duryea Auto Co., of Saginaw, Mich., and possess the desirable feature of a cover which is closed whenever the priming cup itself is closed, thereby keeping out all particles of dust which might otherwise clog it. The cover, as will be plainly seen, is attached to the handle which opens and closes the cup, so that the cover is operated directly in connection with it.



Three types of Duryea priming cup.

Rosen Electric Trouble Lamp.

The latest model of trouble lamp made by A. W. Rosen & Co., 128 Chambers St., New York City, has an insulated handle and a wire screen with a hook upon it to cover the electric bulb, which is in itself well protected by being sunk into the end of the socket. It is handy, efficient and reliable, as it can be carried to almost any part of the boat, especially if the craft is equipped with electric light sockets in which case the plug upon the end of cord may be screwed in instead of the lamp. In case it is desired to use the lamp direct from the storage battery, terminals are provided. The trouble lamp is wired with 10 feet of cord and sells complete for \$2.

Lombard Safety Starter.

The new model D starter made by the Lombard Mfg. Co., of Rochester, N. Y., is designed especially for marine motors and has been adopted by a number of manufacturers as a part of their regular equipment. To start the motor with this device, it is only necessary to pull the hook on the top toward the operator, which forces the gear into mesh with the gear on the engine shaft and holds it there while the motor is cranked. When the motor starts the gears are released automatically. In case of a backfire, the safety mechanism releases the starting crank and the starter itself from the engine. This model can be used either as a front or rear starter, the frame being bolted to the engine bed on each side. The large gear is keyed to the shaft between the clutch and the engine for a rear starter, or to the end of the shaft, which extends through the flywheel or by a special connection in place of the nut that holds the flywheel for a front starter. The safety part of the device can be placed on the bulkhead and the shaft extended to the head of the starter. No part of it requires oil or grease while the motor is running.

Inter-Lube.

This product is made by the Whitney Chemical Co., of Cleveland, Ohio, and is a compound to be mixed with the gasoline supply in the proportion of one quart to 50 gallons of gasoline. When mixed in that manner it combines at once and will not settle or form a sediment. It vaporizes readily and since it does not burn, but is deposited as a spray after each explosion, the carburetor requires no extra adjustment. Inter-Lube keeps piston rings and valves tight, preventing burning and pitting of seats and forms a cushion which causes the valves to operate very quietly.

Speedo.

A device designed to economize gasoline by breaking up into spray each particle of gas after leaving the carburetor is made by the International Accessories Corporation, whose products are handled by the Fulton-Grubb Co., 1146 Michigan Avenue, Chicago. The fact that the gas particles are broken up into spray makes more air necessary, and this device is so arranged that an additional supply of air is furnished automatically as required according to the speed of the motor, thereby obtaining the maximum efficiency from the mixture with the smallest amount of fuel. To attach it is necessary only to drill a hole and tap for a quarter-inch pipe thread on the intake manifold above the carburetor, insert Speedo and screw it in tight so that one flat side of the instrument is up. The device does not require adjustment, although for best results, the proper one of six models should be secured for the motor upon which it is to be used. This instrument is also a quick and easy method of using a decarbonizer. To use this the brass cap is unscrewed from the end of the device and the brass tip of a small rubber tube is inserted in the opening. The other end of the tube may be allowed to hang down into a receptacle containing a small amount of kerosene or other decarbonizing fluids. When the engine is started the liquid is automatically sucked through the tube and sprayed into the cylinders.

Dirigo Compass.

These compasses are manufactured by Eugene M. Sherman, of Lexington, Mass., in a number of different styles, the one shown being the oil compass combined in a binnacle with an electric light. A valuable feature of these compasses is the legibility of the dial, the point standing out clear and sharp against a white background. Excepting the small size the Navy Degree circle has been added to correspond to the compass-rose on the new government charts. The great advantage of the oil compass is the fact that the hardened steel pivot which would ordinarily rust can be used, thus reducing friction to the lowest possible amount. The oil will not freeze, and is adapted to the temperatures of all climates. The bowl is made of cast bronze and is fitted with a flexible diaphragm to allow for the expansion and contraction of the liquid. The diaphragm prevents the formation of air bubbles. The compass is hung in a mahogany box and is equipped with an electric light, which may be operated from one dry cell. The prices range from \$5 to \$15, according to the size.

* * *

Kinney Bilge Pump.

The bilge pump shown in the accompanying illustration is made by the Kinney Mfg. Co., 100 Boylston St., Boston, Mass., and consists of two moving parts, the rotating piston and the separating arm or abutment. This abutment separates the suction and discharge chambers, the lower end resting on the rotating piston through a flexible shoe as shown and being held in contact with it by a spring, thus causing the abutment to rise and fall with the eccentricity of the piston. The pump is positive in its action and has a very strong suction generating sufficient pressure to make an effective tire pump or for washing down decks. The instrument is made of bronze castings and sells in the size for $\frac{3}{4}$ -inch pipe for \$15.

* * *

Johnson Marine Reverse Gears.

The Carlyle-Johnson Machine Co., of Manchester, Conn., manufacturers of the Johnson marine reverse gear, have recently added a new type of an entirely different construction. This gear is completely encased and to prevent oil or grease being splattered about the main shaft, bearings are fitted with stuffing boxes on each end of the gear case. Incorporated within the clutch body is a nest of spur gears, on each end of which the clutch members are mounted. The gears run on four hardened shafts and are always in mesh with the engine and propeller shaft pinions. The gearing and shafting are small so as to be compact, but are made of Vanadium steel. The expanding friction rings of the clutch are also of steel and are placed one on each end of the gear cage with a set of toggle levers in each diametrically opposed for use in expanding them. Spaced midway on the clutch body is the shipper sleeve with two hardened curve-shaped wedges riveted in it to force the levers apart. The leverage is so compounded that but very little pressure is required to operate the clutches. In the bottom of the gear casing is installed this double clutch construction, the hub of the friction cup on one side being keyed on its outside diameter to the bottom case, with the hub of the other friction cup free to revolve in the casing. A shipper fork operates backward and forward in the top half of this casing to throw the shipper sleeve to forward, neutral or backward position. The maximum height of this gearing for a 10-h.p. motor is only 7 inches and its total length is 9 9/16 inches. It is noiseless in any position and is easily installed.

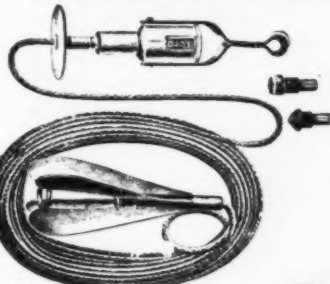
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Henke Green Bronze.

This bronze paint is intended to be used upon the bottoms of boats and is put up in the special can shown in the illustration by the Henke Mfg. Co., 175 Park Row, New York City. The liquid and bronze are kept separated in this can until opened and ready for use. The bronze is manufactured in two colors, green and copper, and is guaranteed to prevent the growth of barnacles or grass upon the boat bottoms. Since the paint is mixed as used it is elastic and easy to apply and dries very rapidly.



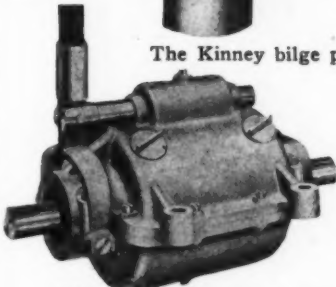
The Dirigo compass and binnacle light.



Durkee taffrail log and speed counter.



The Kinney bilge pump.



Johnson Marine reverse gear.



Day "Safety" spark plug.



Henke Perfection Bronze.



The Parker air compressor.

Durkee Taffrail Log.

This log is one of the most compact upon the market and since it combines a speed counter as well as a log, it will prove a very useful instrument for the owner of a power boat or a sailing vessel. It is made by C. D. Durkee & Co., 2 South St., New York City, in six different styles for sail and power yachts and sells for \$7.50 to \$9, according to the size. This log will register even the slowest speed and the propellers are made to register nautical miles. The instrument is non-magnetic and is made of brass and alloys, so that it cannot rust. To use the instrument as a speed counter the pin at the end is pulled out and the round disc removed. The point may then be placed lightly against the end of a revolving shaft and the spindle of the instrument will turn freely. It is never necessary to set the instrument, but should this be desirable it is easily turned to zero by holding the point against a revolving shaft. A ball thrust bearing is provided for the spindle, which insures a free operation without any tendency to stick.

* * *

Jeffery's Marine Glue.

Jeffery's marine glue is made by L. W. Ferdinand & Co., 201 South St., Boston, and can be used with good results for caulking or paying decks, or it may be applied to the air-tight compartments of life boats, etc., in combination with canvas. It is made also in black, white or yellow of a soft quality for waterproofing canvas. This possesses the peculiar properties of flexibility and durability and although it becomes soft and pliant under heat, it still retains its adhesion to timber, fibre, etc., and is clean and insoluble in water. This kind is made expressly for use in combination with calico between the double planking of diagonally built small boats. For application the glue is melted and painted on the first series of planks with a stiff wire-bound brush, after which the calico is laid on and ironed through. Another coating of glue is applied after this and then the longitudinal planking is applied to copper rivets in the usual way. The glue can then contract and expand with the timbers without cracking. One pound will waterproof three square feet of canvas.

* * *

The Day Safety Plug.

The spark plug shown in the accompanying illustration is manufactured by George F. Day, 21 Haverhill St., Boston, and is one of the most practical and economical plugs manufactured. It is especially adapted to motors which are used in exposed places, since the core being enclosed in a strong metal case is protected from short circuiting or injury from rain or accidental blows. It can be removed quickly for inspection or cleaning. The core is of an improved construction which is guaranteed not to leak, and the casings are made from castings finely finished. The spark plug points are of a special alloy and are extra large. Since all parts are interchangeable any single part broken or lost can be replaced at a small expense. The cost is \$2.50 in any size, and extra cores are furnished for 60 cents each.

* * *

Parker Air Compressor.

This air compressor is of the single cylinder vertical type and is made by the Brunner Mfg. Co., of Utica, N. Y., being one of a number of styles manufactured by the same company. The bore of the cylinder is 1 1/3-16 inches, and the piston is 2 3/4 inches long with a stroke of 2 1/2 inches. It is fitted with three metal compression rings which eliminate all packing troubles. The connecting rod is bronze and the crank shaft runs in bronze bearings. Lubrication is by the splash system, and the working parts are so arranged that they are amply lubricated in this manner. Three valves are supplied, an intake, an outlet and a reliable safety valve that can be set for any desired pressure. This compressor is furnished with a 6-inch pulley for a 2-inch belt and a belt tightener, or idler, at a cost of \$24. The net weight is 21 pounds. This compressor may be placed in any part of the boat near the motor and may be used for furnishing a supply of compressed air for the whistle, air starting or pressure feed system. It is always available and easily started.

A Novel Universal Joint.

The New England Auto Parts Mfg. Co., 18 Tremont St., Boston, a short time ago brought out a universal joint which is very easily installed owing to the divided housings and which is a useful device, owing to the fact that it takes care automatically of any errors in alignment between the engine and propeller which may be due to the transverse movement of the center block. It is somewhat unusual for a universal joint to be constructed so as to permit this transverse movement, consequently throwing the strain upon the engine and propeller shaft bearing, instead of allowing it to be cared for by the universal joint. The transverse universal joint cares for every trouble-making movement between the motor and propeller and really does the work of two universal joints of the ordinary type, which make necessary a floating shaft between the joints. Lost motion is practically overcome with the use of this device.

Neverfurl Flagstaff.

This flagstaff can be used upon the bow or the stern of motor boats and is so constructed that the flag is always unfurled to the breeze. Regular stock sizes are furnished and special sizes can be made to order. The staff is equipped with a rod running parallel with the staff itself and fastens to brass plates which revolve freely upon the staff. The weight of the flag always keeps this rod toward the stern and the flag therefore automatically keeps itself unfurled. Upon returning from a sail, it is not necessary to take the flag from the staff, as the entire outfit may be removed from the socket, which is made with a bayonet lock so that it cannot work loose unintentionally. The flag staff is manufactured by the Novelty Mfg. Co., of Waterbury, Conn.

Finn Bearing Metals.

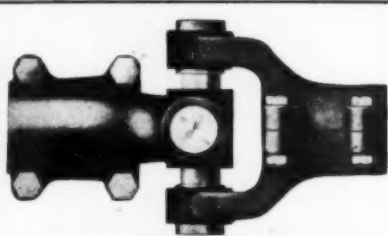
The John Finn Metal Works, of San Francisco and Seattle, have for a number of years made a specialty of various kinds of metals, particularly armature metals, white brass for engine bearings, crank pin metals, and babbitt metals of both the tin base and anti-friction type. The regular armature metal as well as the special armature metal is a tin base babbitt especially for main bearings of marine motors, where the pressure is high. Crank pin metal is also tin base babbitt hardened with copper and it has a great tensile strength and wearing quality. This is also suitable for engine bearings. What is known as Sequoia metal is a tin base babbitt of medium grade hardened with copper and is very free flowing. It is used on bearings of medium high speed engines. The anti-friction metals are used for heavy duty types and the genuine babbitt is for use with small high speed motors.

Auto-Marine Spark Plug.

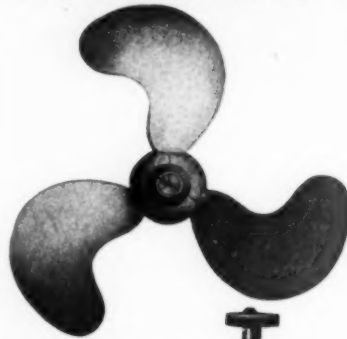
This plug is manufactured by Legnard Bros., Inc., of Waukegan, Ill., and is one of two types manufactured by the company, the other type being a special magneto plug. Owing to its construction, it is as nearly soot and oil proof as possible, and since the points extend into the firing chamber as may be seen from the illustration, they are well protected and are not easily injured. The spark takes place within the recess at the end of the plug and the flame is shot out with considerable force. With less than a ¼ turn of the handle it is possible to remove the entire inner core from the shell, so that the points can be cleaned or adjusted as desired. It is not necessary to detach the terminal wire from the plug in removing it for testing purposes, since the locking device consists of a round tapered cone fitting which is securely locked by two tapered cam shoulders, which lock the plug securely and preventing any damage or leakage. The plug is made in all threads and sells for \$1.50.

Gordon Weedless Reversing Propeller.

This propeller is manufactured by the Gordon Propeller Co., of Cleveland, O., and is particularly adapted to use with an auxiliary. All the blades are interchangeable not only as to size, but as to pitch with the original hub,



The New England universal joint.



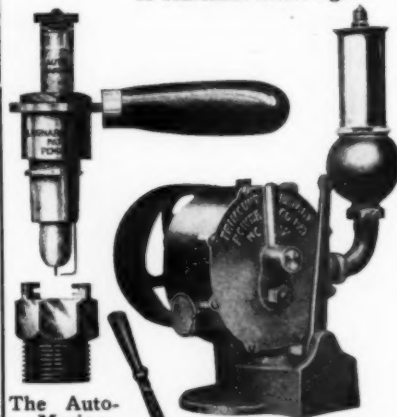
Gordon Weedless and reversing propeller.



The Krice carbureter.

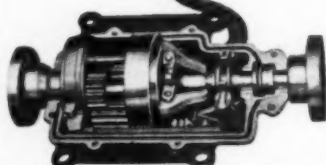


A Hartman dome light.



The Auto-Marine spark plug.

Trimount rotary whistle blower.



The "Bull Dog" reverse gear.

so that any Gordon propeller can very easily be changed into a weedless wheel by changing to other blades. There is no fore and aft motion through the stuffing box, and since the hub is tightly enclosed a perfectly smooth surface is provided with no back lash of the blades. The reversing device is operated by a lever which may be extended to any portion of the boat desired and the reverse equipment is under complete control at all times. The price of the wheel depends upon the size, and extra blades can be purchased at a cost of \$1.50 or more.

Krice Carbureter.

The Krice carbureter is provided with an annular spray device or spraying crevice, so that the gasoline emerges from it in what might be called a spray only 8 to 10 one-thousandths of an inch in width creeps up the side walls of the mixing chamber and thus spreads the gasoline ready for fast vaporization. The air enters the carbureter and passes on to the mixing chamber and finally into the engine intake, but as it is drawn around the mixing chamber for a large interval of its passage, the air comes in direct contact with a cup-shaped wall covered with a film of gasoline. The result is a thin, dry mixture which forms a very efficient gas for immediate combustion. The carbureter is also fitted with an automatic priming device, so that no auxiliary or butterfly valves are necessary. To properly regulate the mixture at various speeds a simple barrel throttle with two openings in it is made to do the work. One forms the opening for the intake, and the other forms the opening for the delivery. Both act in the operation of the throttle lever to control the speed of the engine and at the same time to regulate properly the consistency of air and gasoline mixture for various speeds. The instrument is made by the Krice Carbureter Co., of Detroit, Mich., and can be furnished in three sizes with standard pipe connections.

Hartman Dome Light.

The light shown in the accompanying illustration is made by the Hartman Electrical Mfg. Co., of Mansfield, O., and is intended either for use in the ceilings of cabins or upon deck. It is handsomely made with a reflecting globe of heavy glass and the outside can be furnished in either brass or silver finish. The price with a Tungsten bulb is \$3.50.

Trimount Rotary Whistle Blower.

The Trimount whistle blower is made of bronze metal composition of unusual hardness and the whistle itself is made of brass nickel-plated, which adds to the appearance of any boat. The whistle can be regulated so as to produce different tones by turning it up from or down toward the bulb or air chamber, thus making the sound richly deep or pleasantly shrill according to adjustment. It can be placed at any distance up to 25 feet from the blower, and if proper connections are made it will respond instantly when the driving wheel is brought in contact with the engine flywheel. The upright lever shown is used to bring the driving wheel of the blower in contact with the flywheel of the engine and a cord can be used to accomplish this if convenient. The blower runs with a speed from 500 to 2,000 revolutions per minute. It is made in three sizes by the Trimount Rotary Power Co., of Boston, selling at \$15, \$20 and \$30 respectively.

Bull Dog Reverse Gear.

The Bull Dog gear is made by the Hudson-Kennedy Die & Tool Co., of Detroit, Mich., and is designed especially for motor boat work. The gear cage is of such design that excess strain is eliminated and the propeller shaft extends clear through the machine, giving rigidity and correct alignment. The clutch cone engages with three hardened fingers instead of with the points of set screws. The clutch is of the multiple disc type and therefore occupies less space without sacrificing any holding capacity, perfect balance being assured by the arrangement of the parts to eliminate side strain and vibration. All the moving parts are enclosed in an oil-tight case and the operation is by a single lever. They are made in both iron and aluminum in four sizes.

Pfanstiehl Junior Magneto

The Pfanstiehl Junior magneto is an alternating current machine of the inductor type and is manufactured by the Pfanstiehl Electrical Laboratory of North Chicago, Ill. It has no wires or moving windings of any kind and is especially designed for single cylinder engines to replace batteries and coils. A tubular form of vibrating coil is mounted under the arch of the magnet, making one compact magneto unit. A strong magnetic field is maintained by means of three powerful permanent magnets and the armature winding is stationary, consisting of many turns of very thin copper ribbons. This is immovably placed between the two revolving sections of the armature. This latter is the only moving part of the magneto and is simply a mass of built-up iron. The bearings of the sleeve type and the oiling is by a capillary system from oil chambers provided with a wick. The coil is indestructible and is made by the pancake method of winding. It is equipped with a trouble-proof vibrator. The magneto and vibrating coil are self-contained and the wiring consists of a ground wire, a wire from coil to primer, and the high tension wire to the spark plug. It may be driven by a friction wheel, a belt, or a gear, and will start the engine without the aid of batteries. Although designed primarily for ignition purposes, it may be used to operate about six c. p. of electric light.

Valspar.

Valspar is a special type of varnish manufactured by Valentine & Co., of New York City, and is guaranteed not to turn white when exposed to rain or moisture. It dries over night sufficiently hard to handle and is exceedingly tough. It will resist the action of alkalis, acids, oil, etc., and is practically waterproof, remaining brilliant and unharmed even when continuously immersed in fresh or salt water. Enamels are also made in various colors composed of pigments, finely ground in Valspar and are applied in the same manner just as they come from the can. These are made in either gloss or flat finishes and are all practically waterproof.

Kejex Non-Fluid Oil.

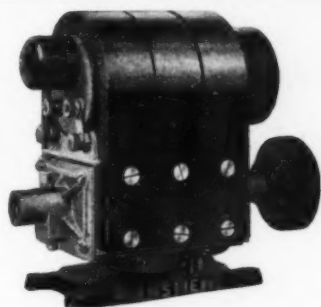
Kejex is a non-fluid oil made by the New York & New Jersey Lubricant Co., of 165 Broadway, New York City, and is easily applied by means of the new can shown in the illustration. This arrangement makes the can serve the same practical purpose as a grease gun and lubricates positively and evenly. The lubricant is continually sealed except when being used to fill the grease cups and the form of the can permits this to be attended to without any inconvenience. It is intended for differentials, steering gears, universal joints, ball and roller bearings, etc., and all compression cups. It is put up in two sizes containing one and two pounds, selling at 50 cents and 75 cents respectively.

Indispensable Devices.

The Mechanical Devices Co., Inc., of Watervliet, N. Y., are making a specialty of combination shaft logs, adjustable shaft hangers, and automatic aligning shaft bearings for use in power boats. The shaft log is made of metal and can be installed in one short operation, so that it will align to any shaft angle and make a tight joint with the keel, at the same time strengthening it. It is made of bronze, or for fresh water of malleable iron, nickel-plated, to protect it from rust. The adjustable hangers are automatically adjustable to any pitch of shaft and can be installed and used without any babbitting. There is no undue friction or binding and the hanger is adjustable to any length and may be used either upon or round flat bottom boats. These are made in bronze only. The prices vary with the shaft sizes.

Perfect Handle Wrench.

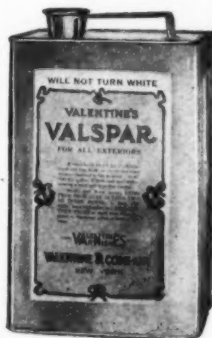
This wrench is made by H. D. Smith & Co., of Plantsville, Conn., and the entire bar from the top of the head to the end of the handle is drop forged from heavy bar steel made by special analysis for this particular



Pfanstiehl Junior magneto.



The Gurney bilge pump.



Valspar.



Kejex non-fluid oil.



Novelty curtain fasteners.



Spout and key of Kejex can.



SwarZ electric reed horn.

tool. An uncommon feature is the yoke, which joins the top and bottom strap of the sliding jaw rigidly so that the jaw itself is prevented from buckling under any amount of strain. The sliding jaw has a longer thread bearing than usual and is reinforced on the back of the bar to compensate for the screw head cut out on the front. The bar is turned smooth, and rounding at the end of the handle, near the thumb screw, can be turned easily and at the other end the swell of the handle is largest, giving from 1 to 3 inches more leverage, depending upon the size of the wrench. This end is locked in under pressure so that the handle cannot come off. It is made in seven sizes.

Cape Cod Pump.

This pump is 2 feet 6 inches long and is made of 2-inch brass tubing, with all fittings of brass with the exception of the wooden handle and the leather packing of the plunger. It is of a convenient size for operating and is long enough to use in the ordinary small boat without bending over too far and will stand all the abuse to which a bilge pump is subjected. It cannot be dented by being thrown around in the boat and as all working parts are screwed together, it can be very easily taken apart for inspection. The valves are brass discs, machine faced, and the only attention required at any time is an occasional renewing of the leather upon the plunger or a small amount of packing in the stuffing box. Four feet of 1-inch rubber hose are connected to the pump on an angle, as may be seen from the illustration, so that the hose cannot become kinked. The capacity is 12 gallons per minute and the cost is \$6.50. The manufacturers are the Cape Cod Power Dory Co., Wareham, Mass.

Novelty Curtain Fasteners.

These curtain fasteners are made by the Novelty Mfg. Co., Waterbury, Conn., in either single or double prong style and, being very easily installed, are a valuable addition to the curtain equipment of an open boat. They are made of heavy brass which will not tarnish and the curtains are held tight by means of the button which turns and snaps tight upon the face of the grommet, as shown in the illustration. These are made in quantity orders at a low price.

Non-Carbonizing Oil.

A brand of cylinder oil known as No. 100 non-carbonizing is being made by the Auto Oil Co., Jackson, Mich. This oil is of medium body, pale in color and can be used all the year around as it will not congeal in cold weather. These oils are known as the Diamond Cross brand and are made from a premium grade of Pennsylvania crude oil by a special process of eliminating the non-essential and non-lubricating elements. The price of No. 100 is 65 cents per gallon, or 40 cents by the barrel.

SwarZ Electric Reed.

The SwarZ reed is a practical signal for motor boats made by the SwarZ-Detroit Co., of Detroit, Mich., and is capable of giving a long or a short blast at will. The fog horn tone and the design of the heavy metal horn arranged to be attached to the deck pedestal is particularly adapted to marine use. The sound is produced by a scientific application of the vibratory principle, the power being obtained from a storage battery or a dry cell. A patented special winding is used to prevent burning out of the contact points which are of pure platinum, and as there can be no burning of the points no adjustment is required. Four magnets arranged in a series exert a balanced pull upon a floating armature disc and the mechanical arrangement is such that the armature is normally so close to the magnets that they constantly exert their maximum power when in use. The recoil is taken up by a stiff bumper spring, giving a stroke of considerable power with very little current consumption. The price is \$16 finished in dark green enamel, or \$20 in solid polished brass.

Bowser Gasoline System.

The illustration shows the recording device of the Bowser Gasoline System, which is made by S. F. Bowser Co., Inc., of Fort Wayne, Ind. Gasoline may be stored in a tank under ground or in any place desired wherever most convenient for filling and the pump may be placed upon the dock or in the boat house. A filter is supplied which may be attached to the pump and which will eliminate water or other foreign substance from the gasoline. The indicator shows the exact amount of gasoline that has been taken from the tank at any time and also registers the amount remaining in it. The indicator, which is shown in the illustration, is an automatic registering measure and is designed to record and control the flow through a pipe line where force is supplied either by gravity or by pressure. It acts not only as meter to register all the oil passing through it, but it can be set to register any amount from 1 gallon up to 1,100 gallons, so that when the desired quantity has passed through the measure the operation will be stopped automatically.

Columbian Universal Strut.

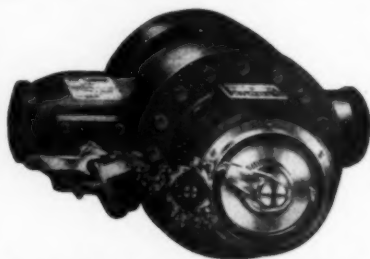
A radical improvement has been made in the universal strut manufactured by the Columbian Brass Foundry, of 625 Atlantic Ave., Freeport, L. I., New York. This universal strut or self-aligning shaft hanger is arranged by means of a ball joint to adjust itself readily to any shaft angle with the bottom of the boat. It contains a grease receptacle, allowing lubrication for the bearing, and the bearing is made of anti-friction metal, although the strut itself is made of manganese bronze. The improvement in the 1912 design consists of two white brass anti-friction bushings or bearings which can be replaced at slight cost in case of wear. This metal makes a bearing particularly well adapted for use with bronze shaft. The struts are made of all sizes from 7 inch drop to 13 inch, and for any size of shaft from 3/4 inches to 1 1/2 inches. The bearing is accurately reamed to size and the strut is furnished ready to be attached to the boat.

Coolidge Wheels.

The propeller shown in the accompanying illustration is a photograph of the one that drove Wigwam II, a 26 footer, 38 statute miles per hour at Astoria, Ore., in a straight-away race held last September. The wheel is of manganese bronze and is accurately built and finished. Some of the fastest racing boats on the Pacific coast have been equipped with this type of wheel and it has also been successful in use upon boats of the larger type. An immense reversible propeller used in connection with a 300-h.p. producer gas engine in the 1,600-ton barkentine Archer, is described in the Yard and Shop section of this issue.

Electric Compass Light Attachment.

Navigating a boat at night requires extreme care and close attention to the compass; navigators who have stood at the wheel for hours at a time will appreciate the value and help of this improvement in compass lighting. Peering into the ordinary binnacle with its glaring light soon tires the eyes and makes it nearly impossible to look out into the darkness and discern even a light for several seconds. The lighting arrangement is shown in the compass illustrated; the compass card is illuminated by reflected light and not by side or overhead light; the light is admitted from the underside of compass bowl and is reflected upon the compass card by a movable reflector having a re-entering angle exposing the card points immediately under the eyes of the helmsman. This method results in a soft diffused light, no light being visible except in the angle of reflector which exposes the card points immediately under reading. The reflector being easily removed the arrangement does not interfere with taking bearings at night, as the card is clearly illuminated without the reflector or shield; 3 1/2-volt lamps are used in the smaller compasses and 3 1/2 or 6-volt in the larger sizes; two to four batteries will give ample light. The device is manufactured by the Marine Compass Co., of Bryanville, Conn.



Recording device of the Bowser gasoline system.

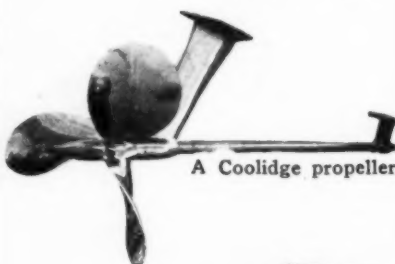


The Detroit mechanical oiler.

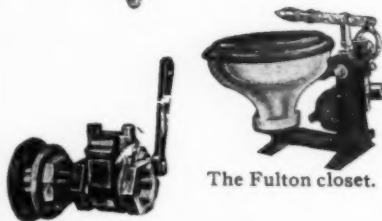


The Columbian universal strut.

The Dow switch.



A Coolidge propeller.



The Fulton closet.

Seacock used with Fulton closet.

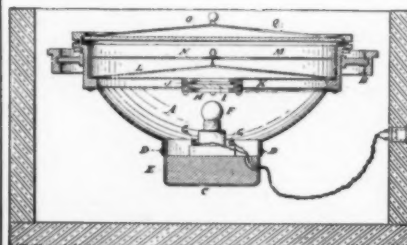


Diagram of the "Perfect" compass light.

Detroit Force Feed Oiler.

The Detroit Force Feed Oiler consists of one or more pumping units actuated by a driving shaft, the entire mechanism being contained in the tank or reservoir. Each pumping unit consists of a double plunger valveless pump, one plunger pumping the oil through the sight feed nozzle from which it drops in plain sight and the other plunger taking the oil from the sight feed chamber under the nozzle and forcing it to the part to be lubricated. The oiler cannot clog or cannot stop feeding because it contains no ball checks or springs. The plungers constantly forcing the oil to the place where it is needed. It is not necessary to turn this oiler off or on as it starts and stops automatically, being driven from the engine's crank or camshaft. When the engine runs faster the oiler also runs faster and delivers more oil, always in the correct amount. When once adjusted to the engine this oiler increases or decreases the amount of oil fed according to the engine's speed, and it is economical because it operates only when needed. An upper piston driven through a bell crank yoke by an eccentric lifts the oil from the reservoir and discharges it from the nozzle. The amount of oil discharged is regulated by the adjusting button on the cover. A port in each of two pistons controls the passages to the other, so that each becomes without additional mechanism mechanically operated valve for the other. This lubricator is made with any number of feeds desired.

The Dow Switch.

The Dow Mfg. Co., Braintree, Mass., have brought out a switch intended to be used with a high tension magneto and battery circuit or with two battery circuits as desired. To connect the switch to be used with a high tension magneto requiring an open ground circuit in order to operate, the ground terminal from the magneto should be connected to one of the points of the switch and the ground circuit from the battery to another. A fourth post on switch should be grounded, leaving the first terminal without any connection. In operating the switch with a magneto requiring a closed ground circuit terminal No. 1 is used and No. 2 is left without any connection. The switch is made of hard rubber with nickel-plated terminals and is furnished with a safety plug which may be removed. All connections are made from the back. The price is \$2.00.

Nelson Spark Plug Wrench.

A double end spark plug wrench is being manufactured by the A. Nelson Mfg. Co., 564 Randolph St., Chicago, which is in reality two wrenches in one, the smaller end being adapted for 7/8-inch and the larger for 1-inch spark plugs. The wrench is adapted for removing or inserting plugs and consists of a hexagonal shaped socket, keyed at the end for the insertion of a straight handle. The length of the body makes the wrench a convenient one for use in places difficult of access and either end may be used with equal facility. The length of the handle furnishes sufficient leverage and when not in use may be removed so as to occupy very little space in the tool locker. The double end feature obviates the necessity for handling two separate wrenches or for carrying several sizes. The finish is highly polished steel, buffed and nickel-plated.

Marine Plumbing.

Gus A. Diem, 20 Fulton St., New York City, is manufacturing a complete line of marine plumbing specialties, but has recently placed upon the market a new type of seacock for the outboard connection of toilets. The old style of seacock is made so that to be water-tight it is hard to open and close. This new seacock is not built on the old spindle type, but is instead of the gate valve type and will operate with a very slight touch, and is absolutely water-tight when closed. It is recommended that a coil spring be connected with the handle of the valve to keep the valve closed whenever it is not in use, a foot pedal holding the valve open only for so long as the connection is in use. This absolutely prevents the danger of a boat sinking, due to a breaking of some of the connections in the plumbing, as the water will always be shut off and it is practically impossible for it to leak.

Among the Clubs



A busy place on a summer's day. Anchorage of the New York Motor Boat Club.

A NOTEWORTHY programme, an ideal day and a record crowd marked the closing event of the 1911 season among clubs affiliated with the Delaware River Yacht Racing Association at Chester, Pa., on Saturday, October 14.

This regatta, which is also sanctioned by the American Power Boat Association, was under the joint auspices of the Alpha Boat Club and the Chester Board of Trade, and was the culmination of a week of festivities known as "Carnival Week," which is an annual event in Chester.

The course selected for these races is a three-mile triangle.

In the semi-speed class, of nine nautical miles, the first honors went to Yeconga; second and third places being accorded Bisbuy II and Raccoon respectively. The start of the final event, the speed-boat class, was marked by an unscheduled and thrilling feature. Zipp III, champion of the Delaware, and the fastest entry in the race, unceremoniously through both her owner, T. Hutchinson, and mechanic into the river at the starter's gun. Thus relieved of her crew she swerved from her course and headed straight for the heavy timber bulkheads bordering the waterfront, striking them bow on immediately beneath the feet of throngs of spectators, one of whom jumped upon her deck and shut off the engine. When the smoke with which she was enveloped cleared away it was found that she was still afloat and that the damage done was surprisingly slight. The speed race was won by Caroline II. The complete summary is as follows:

The Winter's Shows.

St. Louis, Mo.—December 11 to 16. First Annual Show under the auspices of Mississippi Valley Power Boat Association in the Coliseum. Address of W. F. Payne, Manager, Coliseum.
Boston, Mass.—January 27 to February 3. Motor Boat and Engine Show under the auspices of the New England Engine and Boat Association, to be held in Mechanics Building. Address Chester I. Campbell, General Manager, 5 Park Sq., Boston, Mass.
New York, New York.—February 10 to 17. Annual show under the management of Capt. Dressel, in the New Grand Central Palace.
New York, New York.—February 17 to 24. National Motor boat show in the 60th Regiment Armory, under the auspices of the National Association of Engine and Boat Manufacturers. Address Ira H. Hang, 29 West 39th St., New York City.
Montreal, Canada.—March 23 to 30. First National Motorboat and Sportsman's Exhibition in the Arena. Address R. M. Jaffray, Manager, New Freemans Hotel, Montreal, Canada.

SPEED BOATS—15 NAUTICAL MILES.

Boat.	Rate.	St.	Fin.	El. T.	Cor. T.	Fin.
Sea Gull, George Kelsey, owner.	77.32	4:30				
W. S. Vare, G. K. Hogg, owner.	73.08	4:30	5:14:45	44:45	44:45	3
Gryam, J. T. Coyle, owner.	70.2	4:30	5:10:47	40:47	40:05	2
V. S. C. Vail & Schaffer, own'r.	68.85	4:30	5:18:16	48:16	47:14	4
Delphia, G. Muller, Jr., owner.	66.56	4:30				
Caroline 2, E. J. Dumee, owner.	57.06	4:30	5:12:32	42:32	37:45	1

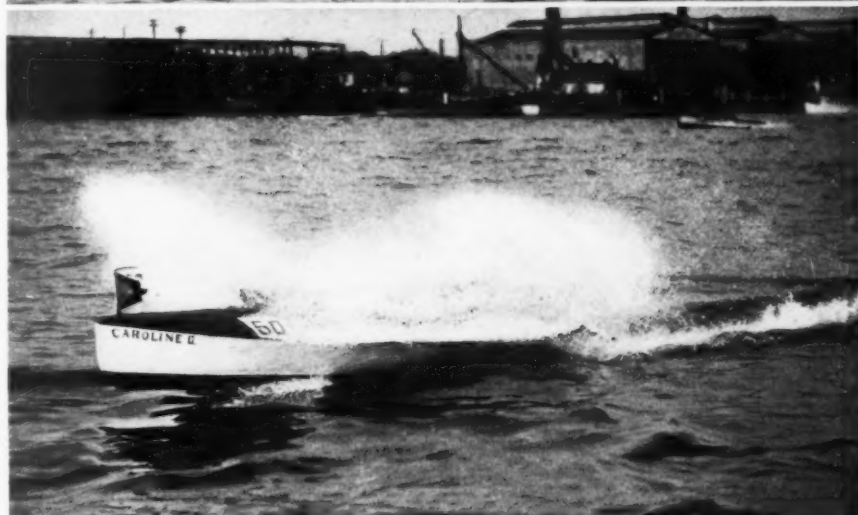
Fishing Skiffs.—Distance, 3 miles. Won by the Edna, owned by F. Pierce. Time, 28:16; second, Florence May, owned by Foster Webster; time, 30:18; third, Little Dick, owned by Abner Walker; time, 32:14.

Open Boats.—Six Miles. Won by The Sylvan, owned by L. McCall; time, 35:15; second, Helen, owned by L. Kuss; time, 39:21; third, Agnes M., owned by W. Marron; time, 41:16.

Cabin Cruisers.—Nine miles. Won by The Picaninny, owned by J. B. Bell; time, 57:33; second, Anna C., owned by H. Campbell; time, 57:34. This race was protested. Third, Muskrat, owned by H. Morgan; time, 58:41.

Semi-Speed.—Nine Miles. Won by The Yekonga, owned by Chester M. S. Company; time, 36:20; second, Bixby, owned by J. B. Fryer; time, 36:44; third, Raccoon, owned by J. S. Truitt; time, 54:52.

The day's programme embraced five events—fishing skiffs, open boats, cabin cruisers, semi-speed boats and speed boats—and wherever conditions would permit, the starts were made in rapid succession, so that the events overlapped each other and afforded an uninterrupted spectacle. This served not only to sustain and increase the interest, but insured the conclusion of the programme at a seasonable hour.



Photos by J. M. Pearce.

At the Chester Regatta, Caroline II (below) and Gryam (above), winners of first and second places, respectively, in the speed boat class.



Launching a sixty-footer at the yard of the Racine Boat Company.

Gas Producers Used on Commercial Boats.

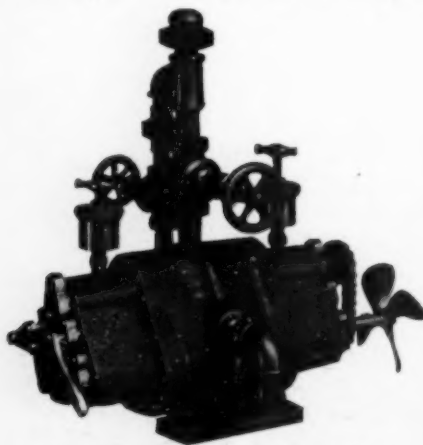
The use of gas producers with internal combustion motors is becoming more and more popular with owners of work boats, both self-propelling barges and tow boats. We show on this page a picture of the 40 h.p. marine gas producer manufactured by A. L. Galusha & Co., 215 Norfolk St., Dorchester Center, Mass. The large cylindrical lower part is where the gas is made out of coal. The dark colored part in the upper corner is where the gas is cooled, washed and dried. The upper part is called the scrubber, and is placed unusually high in this particular case, because the waterline of boat is high, and the scrubber should be above the boat's waterline. A number of commercial boats have been successfully fitted with Wolverine motors and Galusha gas producers, both in this country and abroad. One sold to a customer in Ghent, Belgium, is used exclusively for towing heavy barges on canals and on the river Scheldt, and was found to most successfully and satisfactorily handle four barges carrying each about 300 tons of cargo at an average speed of 6 kilometers (about 4 miles) per hour, which is the speed allowed on most of our canals.

Eastern Branch of Detroit Auto Specialty Co.

The Detroit Auto Specialty Co., Detroit, Mich., manufacturers of "Liberty" gasoline motors and general equipment, have opened an Eastern branch for the sale and export of their marine engines in the Bourse Building, Philadelphia. Paul C. Fisher is manager of the new branch. A large stock of "Liberty" marine engines, Bryant & Berry wheels, and Baldrige reverse gears for the accommodation of their trade in eastern Pennsylvania, New Jersey and Delaware will be carried.

Wheeler Rotary Engine.

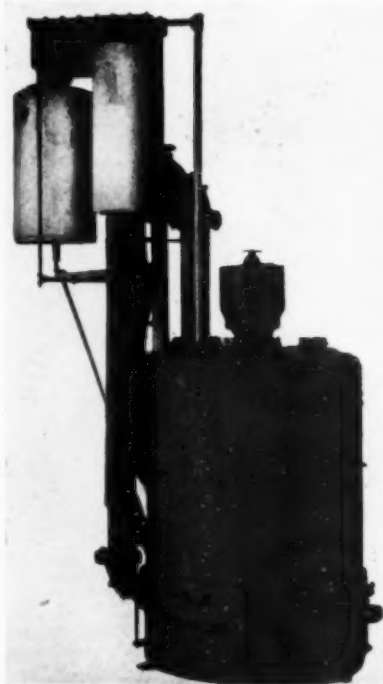
The Wheeler Rotary Engine & Power Corporation, Meriden, Conn., are manufacturers of the Wheeler Compound Reversible Rotary Engine (Steam). In this engine the steam supply valves consist of a main throttle valve and a bypass valve, the main throttle valve



The Wheeler rotary steam engine.

supplying to the rotary valve chambers and the bypass valve designed for use in starting the engine and also for backing up the expansion, when more power is desired than can be obtained by the rotary valve when running on expansion, and by the use of the bypass supply valve, the power of the engine can be doubled at a moment's notice.

Other features of this engine, including the combined reversing and throttle valve, and two exhaust ports, which are brought together at the back of the engine and connected with condenser, or are run open as desired. The engine requires no internal oiling.



The Galusha gas producer for use on commercial boats.

A Marine Motor with Automobile Features.

The Hazard Motor Mfg. Co., Rochester, N. Y., are turning out a motor of first-class construction and complete in design, which has proven very satisfactory during the past year. It is called a "Complete unit marine power plant," and consists of a four-cylinder, four-cycle motor with a reversing gear and multiple disc clutch, combined. It also has a rear starting device, double-thrust bearings, universal joint and oil and water pipes, besides the regular parts of a marine motor. The whole plant is arranged for a one-man control. The clutch is made of crucible saw steel, discs hardened and ground, and with the gearing it runs in a bath of oil. The reverse gear is composed of six steel separate gears of wide face, which run very little faster than engine speed.

Have Been Awarded the "Gran Premio."

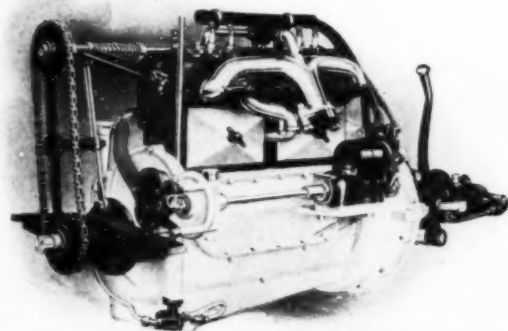
The Hess-Bright Manufacturing Co., of Philadelphia, makers of ball bearings, announce that they have received word from the Deutsche Waffen und Munitionsfabriken, for whom they are importers, that the DWF bearings have just been awarded the "Gran Premio" at the International Industrial and Trade Exhibition of Turin, this being the highest distinction.

Too Many Ciphers.

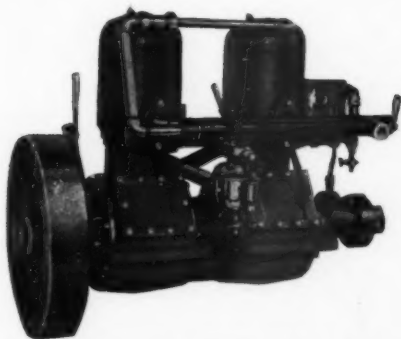
In the article entitled "The Storage Battery and Its Care," by William Wainwright, appearing on page 41 of the November issue of *MoToR Boating*, a couple of unfortunate typographical errors are responsible for an apparent misstatement. In the third column, last paragraph, occurs the sentence, "When it's appreciated that the sparking service needs anywhere from 150,000 to 250,000 volts to do good work," etc. The figures should be "15,000 to 25,000."

A New Racine Sixty-Footer.

The Racine Boat Co., Racine, Wis., have recently completed Montana, a 60 ft. cabin cruiser, owned by Seymour Dane, of Montana, who purchased her from the Racine Co. at a cost of \$12,000. Mr. Dane and crew are now cruising in Montana to the Gulf. The boat is 60 ft in length, has a beam of 12 ft. and a draught of four ft., and is luxuriously equipped, having three large staterooms, fitted with extension berths, a complete sleeping capacity for ten people, together with two toilets and bath-room. The boat is equipped with two 40 h.p. Sterling engines installed in the large engine room, and is also fitted with electric lights, using independent dynamo charging storage batteries for lighting purposes and direct connection to 1,500-ampere arc searchlight. A large pilot house on the upper deck is fitted with brass binnacle and compass, speedometer clock, engine control, chart cases, etc., and a companion stair leads to the engine room, with a separate stair leading to the after stateroom. The galley just aft of the engine room is fitted with refrigerator, sink, range, oil stove, table, dish racks, and under the after deck are distributed five large gasoline tanks with a capacity of 750 gallons.



The Hazard motor has three-point support and multiple disc clutch.



Ten-horsepower Bicknell marine engine.

From the Horton Company.

Word has been received from the Horton Boat, Engine & Supply Co., Rochester, N. Y., that Clinton B. Struble and Wendall T. Bush, of Penn Yan, N. Y., have purchased through the Horton people a 44 ft. raised-deck cruiser for use next season on Lake Keuka, N. Y. The craft is beautifully finished in solid mahogany throughout, and has a 4-cylinder, 50-60 h.p. Brownell engine installed, together with a complete electric lighting outfit. W. H. Rogers, of Rochester, N. Y., who is constructing a 50 ft. cabin cruiser, has just placed his order for a 28-40 h.p. 4-cylinder Clifton motor through the Horton Boat, Engine & Supply Co., of Rochester. This motor will be equipped with double ignition system, consisting of K. W. Model H high tension magneto, and regular distributor and coil for auxiliary.

Shea Sales Company.

Mr. Maurice H. Shea, late manager of the marine engine and boat department of the Canadian Fairbanks Co., has announced to the motor boating public that he has recently formed the Shea Sales Co., with offices at 296 St. James St., Montreal, as motor boat and marine engine specialists. Mr. Shea's knowledge and experience in the marine engine and motor boat business is an assurance that the concern will handle nothing but the most reliable lines. A department for the sale or charter of all the available motor boats, houseboats, yachts and auxiliaries in the local market and in the United States will be personally conducted.

Gurnet Dories as Police Patrol Boats.

Among the interesting exhibits recently shown in the Municipal Budget Exhibition in New York City was a police patrol boat of the Gurnet dory type, built and equipped by the Atlantic Co., Amesbury, Mass. It is now in service and docks at Pier A, Battery. The fact that motor boats are used in police service is interesting information to the average citizen. A number of Atlantic boats or Gurnet dories are used by the police department in their work in and around the harbor. The excellent seaworthy qualities of the staunch little craft, the reliability of the motor and installation have won a place for it in this service where real merit is the foremost consideration.

Cleveland Concern Moves to Larger Quarters.

The Motor Boat & Supply Co., 1516-1520 Columbus Road, Cleveland, Ohio, after three years in the motor boat game with a steady increase of business find their present location not large enough to carry on their work satisfactorily. Therefore, they have decided to move into larger quarters shortly after the first of the year. They will have on display in their new quarters a number of boats, ranging in size from 16 to 24 feet. The concern has the agency for the well known Davis Dink, samples of which are carried on display. Their line of lamps fittings and accessories is quite complete as they carry a large stock and are in a position to equip a boat with everything that is required upon it. They also have the agency for a number of well known engines, a number of which are carried in stock. The Barnes heavy-duty, four-cycle engine is attracting considerable attention for cruisers and working boats. This is made in six, eight and ten horsepower single-cylinder, and twelve, sixteen and twenty horsepower, double-cylinder. The Barnes motor has been installed in a number of the fishing boats on Lake Erie and has been meeting with considerable favor.

The Ferro Co. Enter the Stationary Engine Business.

The Ferro Machine & Foundry Co., manufacturers of the Ferro Marine Motor, have completed arrangements to go into the stationary engine business on a large scale.

Mr. Crispin Oglebay, president of the Ferro company states that this step has been taken owing to the fact that the regular marine type of Ferro Engine has been used more and more extensively for stationary purposes from year to year on account of its exceptionally high grade construction and freedom from complicated parts. Thousands of Ferro engines with governor attachments, Mr. Oglebay states, are now in operation for stationary use throughout all parts of the world.

The Ferro Machine & Foundry Co., are particularly well situated to manufacture and market stationary gas engines. Unquestionably they have one of the largest and finest equipped plants in America for the production of gas engine parts. The reputation they have acquired in marine engine circles for building an engine of the very highest standard of excellence assures high quality for their stationary engine output.

In order to keep this additional output from interfering with the regular marine engine business of the company, a large new building of the most modern construction throughout is now under erection and nearly completed, which will nearly double the capacity of the foundry and add materially to the capacity of the machine shop, assembling room and other departments.

The Ferro Machine & Foundry Co. are specializing on a 3 h.p. portable outfit which embodies a new and unique idea in stationary engine manufacture. The outfit is mounted on wheeled skids as shown in illustration, which



Ferro portable power plant—note convenient "underslung" construction.

systems, vacuum cleaners, spraying apparatus, small workshops, etc., can take up the matter with the main offices of the Ferro Co., 36 Hubbard Ave., Cleveland.

The Ferro Machine & Foundry Co. advise that they are desirous of establishing sales agencies for their stationary engine in all unoccupied territory. There is considerable unoccupied territory at present, but this portable motor gives promise of being widely used.

Convention of Gray Motor Car Co. Agents.

A large number of the agents and representatives of the Gray Motor Car Co., Detroit, Mich., attended the annual convention for agents of that company, held at the offices of the Gray Motor Car Co., Detroit, Mich., October 23rd to 28th. On October 26th Mr. O. J. Mulford, president of the Gray Company, entertained the visitors and heads of the departments on board his cruiser Viking, which is a 95-footer with roomy interior construction. The convention gave the agents a chance to see for themselves the Gray plant and its up-to-date mechanical equipment, which is on a par with some of the finest automobile factories. Many phases of the gasoline engine business were taken up in detail and carefully considered, and plans for next year's business between the manufacturer and agents were carefully worked out.

Boston Show to be Biggest Ever.

The decided impetus which motor boating has received throughout the East is well indicated by the way in which the manufacturers and dealers are taking space in the coming Motor Boat and Engine Show under the auspices of the New England Engine & Boat Association, to be held in the Mechanics' Building, Boston, January 27 to February 3, 1912. The largest allotment of space in the history of the shows has been made and it is very likely that at the present rate of applications it will be necessary to take the entire Mechanics' Building. When it is considered that this building takes in nearly 105,000 sq. ft. of exhibition space, the enormous proportions of this show are evident. A large number of novelties have been obtained, and Manager Chester I. Campbell is on the alert for more unique features, while Arthur N. Dodge, former New England manager for the National Boat and



Cups won during 1911 by Sterling Engines in Canadian waters.

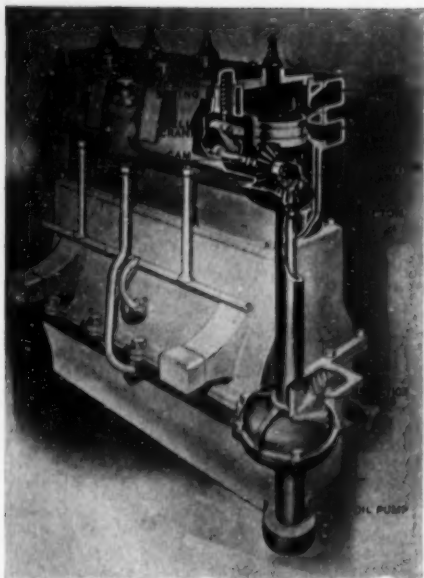
enables one person to move it about from place to place "just like a wheelbarrow." As the majority of persons who buy an engine want it for operating a number of different machines located in different places, this feature is of the greatest value and multiplies the engine's capacity for usefulness.

This engine is sold at a very moderate price, the outfit including everything ready to run, engine, metal base, wheeled skids, cooling tank, gasoline tank, carbureter, pulley, oiler, grease cups, timer, governor, muffler, ignition equipment, can of cylinder oil and handy wrench being offered for \$80.00 f. o. b. Cleveland.

An illustrated pamphlet has been issued describing this outfit in detail, copies of which are being sent to interested parties throughout different sections of the country. Anyone interested in the purchase of an engine for such purposes as operating light farm machinery, independent water supply and electric lighting



A Defoe cruiser. For description see section on designs.



A split ring valve device is employed on the Sphinx.

Engine Co., is now in the West in the interest of the show. Those contemplating taking space in this show, if they have not already done so, should make application without delay. Diagrams and literature may be obtained by addressing Chester I. Campbell, General Manager, Executive Office, 5 Park Square, Boston, Mass.

Stickler Weedless Wheel Popular in Florida.

Stickler Weedless Wheel Company, of Portage, Wis., have arranged with the Norwalk Brass Company, Norwalk, Conn., to manufacture their wheels for the Atlantic Coast territory, in order to insure prompt filling of orders. A stock of wheels will be kept at Norwalk at all times. The Stickler people are making a specialty of a three-blade weedless propeller which is meeting with a great deal of favor in Southern waters, especially in Florida.

New Address of Gorham Engineering Co.

The new address of the Gorham Engineering Co., naval architects and engineers, and manufacturers of marine and stationary gas engines, is the corner of Glascock and Peterson Sts., East Oakland, Cal. The concern has recently moved into new quarters at this location.

Sphinx Valveless Gasoline Motor.

After internal combustion motors appeared to have settled down to a standard type in which poppet or mushroom type valves formed an indispensable part, design was revolutionized a couple of years ago by the placing on the market of what is somewhat erroneously known as a valveless motor. In place of poppet valves, admitting the fresh gases and discharging the exhaust by being lifted off their seats, the newer type of motor employed sliding or rotary sleeves, uncovering ports in the cylinder walls. It was really an application of steam engine practice to internal combustion motors; thus the application and not the prin-

ciple was new. It is now generally conceded that the sliding valve type of motor has the advantage of silence, especially at low engine speeds, and that, owing to its large valve area and the form of its combustion chamber without pockets, it develops greater power at lower engine speeds than the average poppet valve motor. It has the disadvantage, however, of greater complication, considerably higher cost of production, and the absence of "foolproofness" found in the standard poppet-type motor.

The Sphinx Motor Co., 30 Church St., New York City, claim for the Sphinx motor a combination of all the advantages of the slide-valve type, together with the best features of the poppet valve model. Abolishing poppet valves and putting to one side the costly and complicated sliding or rotating sleeves, the inventors of the Sphinx motor have made use of a split ring having a sufficient reciprocating motion within the cylinder to cover and uncover the intake and exhaust ports in the cylinder walls. As in the case of the slide valve the principle is not new, for split rings have been used for a number of years in connection with pumps, air compressors and various other types of machinery. Previously, however, it has been necessary to make use of a stuffing box, and it is in the abolition of this and the securing of absolute gas tightness by the ring itself that is to be found the ingenuity of the Sphinx system. The accompanying cut shows the general working arrangement of the Sphinx motor.

A Varnish Endurance Contest.

Valentine & Co., 257 Broadway, New York, N. Y., manufacturers of "Valspar" spar varnish, have just inaugurated a varnish campaign by sending a letter to the various motor boating clubs throughout the country, suggesting the following test of spar varnishes and offering to assist in the interesting trial of various kinds. They recommend that each of the varnishes to be tested be placed on: properly prepared surface and the time of drying noted. After all are dry, the sample should be immersed in water for a week. Then it should be exposed to the weather (southern exposure) for another week, and then put back into the water for a week more; and so on alternately, until the test has gone far enough to show clearly the superiority of one varnish. Some of them will drop out the first week. The Valspar people offer to co-operate with the clubs in making the test in the following ways: First plan—the committee to obtain a piece of mahogany, say 3 ft. long, 6 in. wide and from 1/2 to 1 in. thick. A good primer is to be used, then a good filler containing a dark stain (not aniline stain). Then, in the open market, a small can of each of the varnishes to be used should be purchased and the test made. Second plan—the Valspar people will furnish the mahogany piece all prepared and stained with guaranteed material ready for the varnish. The committee then buys the varnish and puts it on. Third plan—the Valspar people will furnish the prepared wood and will send the committee samples of the varnishes specified in the original cans and Valspar in the original can, standing all expense. Fourth plan—the Valspar people will send the sample properly prepared and varnished with Valspar and each of the varnishes that may be specified, guaranteeing that each varnish is a genuine sample and properly put on. It should be emphasized that in making the test the same brush should not be used for the different varnishes unless thoroughly cleaned each time with turpentine. All motor boat owners are interested in varnishes and this opportunity is one which will undoubtedly be embraced by many clubs and the outcome watched with interest.

A Distinctive New Type of Marine Oil Engine.

The Blanchard Marine Oil Engine is a new design of internal combustion motor that operates on kerosene, fuel and distillate oils with a high commercial efficiency. It operates on the two-cycle principle and uses a compression that is much higher than the ordinary oil engine, but lower than the Diesel. It, therefore is high in economy, but is not subject to severe shocks.

On the up-stroke the piston uncovers a port admitting air to the closed crankcase. On the down-stroke this air is compressed slightly and then is transferred through ports to the cylinder above the piston. On the next up-stroke this air is compressed and just before the end of compression the fuel is atomized

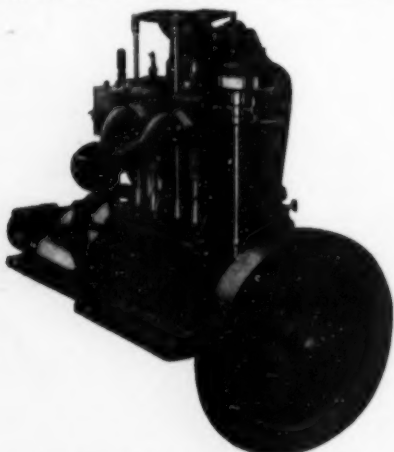
into the cylinder by a pump. No compressed air is used in atomizing the fuel, thus doing away with a multi-stage high pressure air compressor and accompanying troubles and expense. The finely atomized oil is turned to a gas by the heat of compression, then instantly ignited by coming in contact with a hot plug located in the head. The plug is kept hot by the heat of the burning fuel. The pump which atomizes the oil is so driven that the oil is equally well atomized at all speeds of the engine. This is a very important point in marine engines which must be capable of running at reduced speeds. Poor atomizing of the fuel is one of the causes of incomplete combustion and consequent waste of fuel, carbon deposit and disagreeable odor of exhaust. The superiority of the positive firing, compared to that of a gas engine, is appreciated by those who have operated gas engines. It has been stated that more than two-thirds of gas engine troubles are due directly to the ignition equipment. Practical tests have shown the fuel consumption of the Blanchard Marine Oil engine to be not more than one-tenth of a gallon per brake horsepower per hour, the actual figures depending on the analysis of the oil used. This means with fuel oil a horsepower is delivered for less than 1/4 of a cent. At less than full load the economy of the Blanchard Marine Oil Engine approximates very closely the full load economy, whereas the gasoline engine working under half load will take fully 50% more fuel per brake horsepower per hour than at full load. The engine is made in six sizes from 8 to 100 horsepower, with one to four cylinders. A stationary engine is also made in the same sizes. The engine is made by the Blanchard Machine Company, 64 State St., Cambridge, Mass., and the company have prepared a table giving the exact cost of operation.

The Lamb "Special Ten."

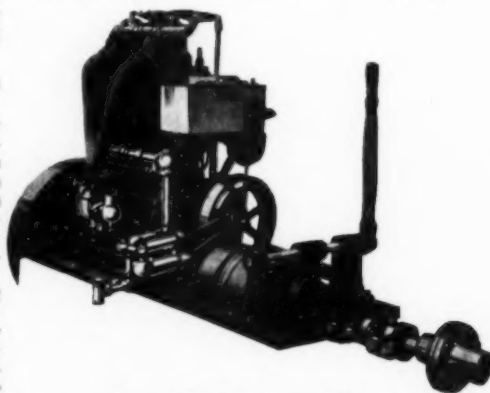
On this page appear two views of the new Lamb long-stroke "Special Ten" motor. This is a heavy-duty engine especially designed for hard and continuous service, and is one which will appeal particularly to the fishing trade and owners of boats engaged in regular commercial work, where reliability, low cost of upkeep, and fuel economy are the important points considered. The new Lamb product is an engine of very few parts and is extremely simple in construction. It has an exceptionally large crank (2"), large rods, pins, bearings and valves, long pistons and an exceptionally long stroke, slow speed, positive lubrication, the best of equipment and exactly the same care in construction detail and testing as the regular Lamb line receives. The equipment is complete as furnished with other Lamb motors, while the price is very low, being put on the market by the makers to compete with engines of the two-cycle type.

Twelfth Congress of Navigation.

Under the auspices of the Permanent International Association of Navigation Congresses, the Twelfth International Congress of Navigation will meet at Philadelphia some time during the year 1912, sitting probably about a week. International congresses have been held in the different European countries at various intervals since 1885, and the assembling in this country of the leading shipbuilders, waterway engineers, and maritime experts of the world may be both helpful to us as a nation, and pleasing in the sense that American hospitality may be better understood abroad. A number of vital subjects, many of them having an important bearing on motor boating and the motor boat industry, will be considered at the congress. Applications for either temporary



The Lamb Special ten—starboard.



Port side, Lamb special ten.



The Mitchell motor.

or permanent membership in the International Association should be made to Lt.-Col. J. C. Sanford, Room 344, Bourse, Philadelphia, Pa., from whom further information regarding the coming Congress may be obtained.

Bruns Kimball & Co. Still Growing.

The business of Bruns Kimball & Co., Inc., is still growing and has compelled the firm to again enlarge its New York office and show rooms. They have outgrown their quarters at 134 Liberty Street and have moved one door east to 132 Liberty Street, where they will exhibit a still larger stock of new and second-hand engines than ever before was exhibited in the City of New York by any firm.

The Jersey City shops and warehouse of the firm have also been enlarged to meet the demands for the coming season and are now being stocked with both two and four-cycle engines, ready for prompt delivery during the spring. A special storehouse has been taken for the storing of engines ordered at this season of the year for spring delivery. This enables the firm to accept orders at the present date for prompt delivery at any time specified.

There will be a complete display of all sizes of Sterling engines, including the new model four-cylinder, 25-32 horsepower, as well as the newly designed, 1912 model, 130 h.p. racing machine.

The firm will be in a position during the season to supply the well-known Eagle two-cycle motors in any size and quantity, and guarantee prompt delivery. Last season's demand for Eagle engines exceeded the output and consequently caused delay in delivery.

The Bayonne Winter Storage Yard and Repair Shops, located at the foot of East 39th to 41st streets, New York Bay, have been improved, also making it possible for the firm to do repair or installing work at short notice and at reasonable prices. A low rate of winter storage has been established so as to enable boat owners to have their boats properly taken care of over the winter at a low cost. This, in connection with their large brokerage department, enables Bruns, Kimball & Co. to properly handle its clients and easily sell any boats which may be sent to the yard for that purpose.

Montreal To Have Show in March.

The 1912 National Motor Boat Show and Sportsmen's Exhibition, to be held in the Arena, Montreal, March 23 to 30, 1912, will be the first of its kind held in Canada. It will cover motor boats, marine engines and accessories. The manager is R. M. Jaffray, New Freeman's Hotel, Montreal, Canada, to whom application for space or information about the show should be made.

American Ship Windlass Co. Move.

The American Ship Windlass Company announce the removal on November 1 of their shops and main office to their new home at Cumberland St. and Aramingo Ave., Philadelphia, Pa. The change means increased shop and foundry facilities which will enable the builders of the "Providence" windlass to turn out the very highest grade of machines and to meet the needs of the increased demand with better and more prompt attention than in the past.

Belle Isle Motors for 1912.

The Concrete Form and Engine Co., of Detroit, Mich., manufacturers of the well-known Bell Isle motors, announce that there will be no radical changes made in their product for 1912. They report that these engines are giving entire satisfaction in the hands of experts and novices alike under every possible circumstance. A few improvements in construction will be made, but these do not have anything to do with the operation of the motor except to make it more convenient.

Another Triumph for Knock-Down Frames.

The Robbins Perpetual Challenge Cup, the blue ribbon trophy of the year for cruising motor boats on the Pacific Coast, is to adorn the San Francisco club for another at least, thanks to Flollie, owned by Mr. I. H. Cory. This is the second occasion on which Flollie has brought to the San Francisco organization the honor of retaining the Robbins trophy. The boat's performances reflect much credit, both to Mr. Cory and her designers. She was built by the owner from a knock-down frame purchased of the Niagara Motor Boat Co., North Tonawanda, N. Y., and according to Mr. Cory, "she went together without a hitch anywhere." When one considers that Mr. Cory, who is by no means a professional boat-builder, can construct his own boat and win a coveted trophy against higher powered boats twice in succession, it would seem to follow conclusively that the material he received from the frame builders was as near perfect as it possibly could be made. Flollie is a raised-deck cruiser, with compromise stern. She is 28 ft. x 6 ft. 8 in., and is powered with a 15-h.p. Ferro.

Growth of the E. J. Willis Co.'s Business.

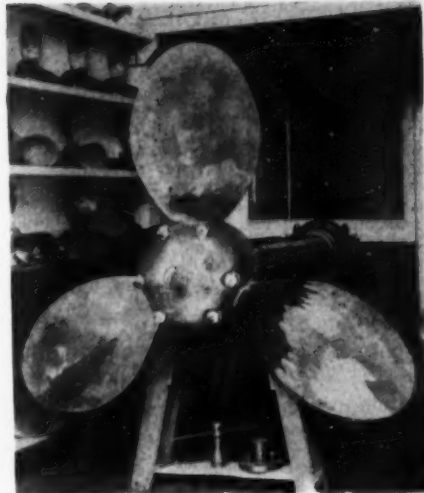
On July 15, 1910, the firm of E. J. Willis Co., New York City, moved to their present quarters from their old home in Park Place, where they had been doing business for ten years on a large scale. Their present building runs from 85 Chambers St. through to 67 Reade St., a thoroughfare embracing two floors underground. The motor boating department was established in July, 1909. Although the season was half gone, when the department was organized it had a remarkable growth almost from the very first, so that five months later, in January, 1910, a successful department had been planted. They have so increased their stock since that there is hardly anything in either motor boat fittings or automobile accessories that they cannot supply. They are Eastern representatives for the Bryant & Berry speed propellers and have done a large business for these people in the East during 1911. They are also representing the Universal Machine Co.'s "Toledo" motors and the Roper reversible propeller, in addition to a number of other marine supplies of every description applicable to almost any type of boat built.

Toppan News.

The Toppan Boat Mfg. Co., Boston, Mass., report many orders already entered for the coming season, and anticipate that there will be more power boats used than ever before. They have just received an order from Myron Bedell, Saugerties, N. Y., for one of their 25 ft. Safety launch hulls, complete with canvas covered decks, bulkhead forward, special constructed boat throughout, which will be equipped with a 12 h.p. jump-spark engine. They have just shipped one of their 20 ft. regular smooth planked dories, equipped with 5 h.p. Toppan engine, regular fittings, also with one of the double Toppan folding spray hoods, to W. A. Danielson, for quartermaster's use at Fort Worden, Washington. This is the third Toppan boat that has recently been shipped to this fort for government use. They are also constructing one of their 19 ft. smooth planked dories, equipped with 5 h.p. jump-spark engine with reverse clutch, to be used in Japan, by the American Baptist Foreign Mission Society. This company are making a specialty this season of an extra finely finished power dory, and this boat is already meeting with large sale. There is a straighter nose on the boat than heretofore, with very little overhang, with engine placed just aft of midship, and one wide horseshoe seat back of motor.

Pierce-Budd Co. Have New York Agent.

The Pierce Budd Company, of Bay City Mich., have appointed Joseph Boam, 446 Adelphi Street, Brooklyn, N. Y., as their representative in greater New York.



This Coolidge propeller is 82 inches in diameter.

Coolidge Air Reversing Propellers.

While the air-reversing propeller is not a strictly new idea, that designed by L. H. Coolidge, marine architect and engineer, of Seattle, Wash., for the barkentine Archer, which is being fitted with a marine producer gas installation, is not only the largest yet cast but it combines a number of new features. One feature of this big propeller, which is 82 inches in diameter with maximum pitch of 82 inches, is that a center is used that never before has been brought into play. This propeller has been designed and cast with an extreme nicety as to detail. The workmanship on it is practically perfect. The trunions have been protected with jib blocks. Every bit of space has been cared for and each recess is nicely machined out, perfecting a nice working fit. Another difference in this particular propeller is that the propeller is carried on the covering bushing which is 4 feet long and 1/2 inch thick, bushed up to one inch at after end. It lies in *lignum vitae*. The bushing is riveted and bushed up and the hub is put on with threads and three keys.

The Universal Hydrocarbon Gas Producer.

Looking not unlike an ordinary muffler, the Universal Hydrocarbon Gas Producer has been attached to two and four-cycle engines with a success that indicates a big future for its makers. With this little attachment the marine motor may be run with kerosene for fuel with none of the ordinary objectionable features that we are accustomed to associate with this use of kerosene. That there is absolutely perfect combustion is evident to anyone familiar with the internal combustion engine by a simple glance at the exhaust. The latter is absolutely free from smoke and also from odor. A silk handkerchief can be held over the exhaust and will remain free from discoloration and odor. The engine is started on gasoline and as soon as the necessary temperature is obtained, which is indicated by a thermometer, the gasoline is shut off and kerosene turned on. Somewhat greater power is the result as well as a greater range of speed control and a perfect mixture under all conditions of speed or load. An ingenious device for automatically shifting from gasoline to kerosene has been invented and can be attached to the converter if desired.



The converter of the Universal Oil Converter Company.

The very great need of a successful hydrocarbon gas producer is patent to anyone who has looked even casually into the situation now existing. Besides the much greater cheapness of kerosene, there are other advantages in addition to those already enumerated. Chief of these is the much greater safety possible from the use of kerosene, which is not restricted by fire underwriters, as is the use of gasoline. The Universal Oil Converter Co., 227 Borden Ave., Long Island City, N. Y., are the fathers of this producer.

Rapid Growth of Mianus Company.

The Mianus Motor Works have recently added to their manufacturing facilities by

Jordan Bros. Never Sink Spar Buoys.

The Jordan Brothers Lumber Company, Norfolk, Va., are manufacturers of the Never Sink Spar Buoy, which is prepared especially for use in swift waters and cannot be swept under by the tide. The makers have placed one of these buoys at the anchorage of the New York Motor Boat Club and this can be seen in the water from 145th St. and Riverside Drive, New York. The buoy is 25 inches long and in its present location the depth of the water is 40 feet. The buoy carries 50 feet of $\frac{5}{8}$ -inch chain and 350 pounds of ballast in addition to the anchor. It has a projection of 8 feet above the water.



The boat in which Capt. Gordon is circumnavigating the Eastern U. S. and Canada.

building a new plant at Stamford, Conn., which is but one hour from New York City. The new plant is equipped with special machinery for the exclusive manufacture of marine gasoline engines, which business this Company have been identified with for the past fourteen years. In the plant there are as many machines as there are parts of an engine, so that all parts of the motor are being made at the same time, thus enabling the Company to build with maximum rapidity. They are manufacturing marine engines on the same principles that are used in the making of sewing machines, typewriters, etc. The cylinder system, rings and crankshaft and other essentials are finished by grinding, and are ground within one-thousandths of an inch. All parts are strictly interchangeable, and the extreme accuracy of manufacturing the parts saves time in assembling and produces more perfect engines.

George B. Carpenter & Co. Change Location.

George B. Carpenter & Co., of Chicago, manufacturers and jobbers of marine supplies and motor boat accessories, will on or shortly after January 1st, remove from their South Water Street premises to new and much larger quarters on the corner of Wells and Michigan Sts., about two blocks from their present location. This move will permit the consolidation of several departments which have hitherto been separated and will give the company much better facilities for handling their growing business. The company retain their storage warehouse at Indiana and Orleans Sts.

Wisconsin Motors Have Boston Agency

The Wisconsin Machinery & Manufacturing Company, Milwaukee, Wis., have just completed an important agency arrangement covering the sales of Wisconsin Valveless Motors in New England. This agency has been taken by Arthur P. Homer, with office and salesrooms at 156 State St., Boston, Mass. A full line of Wisconsin motors will be on exhibition at his showrooms and such duplicate parts as may be advisable will also be in stock to accommodate the users of these motors in this field.

Expansion of Baldridge Gear Business.

The manufacturers of the Baldridge Reverse Gear announce a considerable increase in their facilities for handling business. Their capital has been increased to \$100,000 and the name of the company has been changed to the Baldridge Gear Co. For four years the concern has been doing business as the Smith & Baldridge Machine Co. The officers and management of business remain the same as in 1911. On Oct. 15 the company moved to their new factory, which is situated on the main line of the Michigan Central Railroad, extending from West Grant Boulevard to Roosevelt Ave., Detroit. The new factory is on the ground floor entirely and provision has been made for additional stories to accommodate a future expansion of the business. The company report a most successful year for 1911. Previous trade quotations are withdrawn and new prices quoted to the trade upon application.

New Product of Grimm Mfg. Co.

The Grimm Mfg. Co., of Buffalo, N. Y., will have for the 1912 season a four-cylinder, long stroke, marine engine, which they will put upon the market at a popular price. The cylinders of this engine have a bore of $3\frac{3}{4}$ x $4\frac{1}{2}$ -inch stroke and the engine develops from 12 to 16 h.p. at 800 to 1200 r.p.m. Cylinders are cast in pairs and are made of the finest grade of gray iron. One of the most important features of this engine is the one-piece crankcase. This construction permits of extreme rigidity and easy accessibility. The entire crankshaft can be removed in a few moments without removing the engine from its foundation or disturbing the cylinders, pistons, water connections, etc. It is absolutely oil-tight. The jump-spark system of ignition is used and each engine is furnished with a K-W high tension magneto. A copy of this company's new 1912 catalogue will be sent free by addressing the Grimm Mfg. Co., 43 Erie St., Buffalo, N. Y.

Electric Lighting of Automobiles.

The Engineering Department of the National Electric Lamp Association, Cleveland, Ohio, have recently issued a comprehensive and informative bulletin entitled, "Electric Lighting of Automobiles." The bulletin will be sent free upon request and will be valuable to those interested in up-to-date motor car lighting.

Edinburgh, not Edinberg.

The Bayonne Castings Co. have called our attention to an error in their advertisement in November issue of Motor Boating, in which the name Edinberg is wrongly spelled. The correct spelling is Edinburgh and

not Edinberg. We are glad to make the correction.

National Merchant Marine Association.

On Nov. 3rd the National Merchant Marine Association held a meeting at the Waldorf Astoria Hotel, New York. Incorporation papers are being filed and the National Merchant Marine Association ask for hearty co-operation in their task of assisting in the up-building of the American merchant marine. The president of the organization is John H. Hanan; the secretary, James J. Ewell, and the treasurer, Chas. D. Durkee.

Off on Long Business Cruise.

Captain F. C. Gordon, president of the Gordon Propeller Co., Cleveland, Ohio, and his son Clyde, started a short time ago on a cruise, remarkable both for its length and the fact that it is one never before taken by a motor boat. Starting from Zanesville, Ohio, the route lies down the Muskingum and Ohio rivers, to the Mississippi, thence down the Father of Waters to the Gulf of Mexico, then around the Florida Peninsula, up the Atlantic Coast to the mouth of the St. Lawrence, thence to Cleveland by the St. Lawrence, Lake Ontario, the Welland Canal and Lake Erie. The long cruise has as its chief object the interests of the Gordon reversible propeller, of which Captain Gordon is the inventor. The long and unique voyage will undoubtedly give his invention much desirable publicity while, by visiting all ports along the route and giving demonstrations of the propeller at each, a large amount of business will be transacted. The Gordon reversible propeller is already well known, however. Flyer, the boat which navigated the dangerous Snake River rapids between Washington and Idaho, was equipped with one of these propellers. The boat which Captain Gordon is using on this remarkable cruise is sturdily constructed and is powered with a 15 h.p. Ferro engine of the jump-spark type, built by the Ferro Machine & Foundry Co., Cleveland, Ohio. The current with electro was supplied by the Richardson Engineering & Mfg. Co., Hartford, Conn.

S. M. Jones Company Appointed Eastern Agent.

The S. M. Jones Company, 136 Liberty St., New York City, manufacturers of the Ralaco engines, Toledo, Ohio, have secured the services of E. W. Graef to look after their marine engine business on the Atlantic coast, and have arranged that he make their New York office, 136 Liberty St., his headquarters. The line of Ralaco engines will be carried in stock at this office and will be gladly shown to interested parties.

The Frisbie Six-Cylinder Motor.

The Frisbie Motor Company, of Middletown, Conn., have placed on the market a six-cylinder marine motor which is in two sizes, a 50 and 75 h.p. respectively. The valves of this design are situated in the head of the cylinder, together with their seats, are in removable cages, making grinding or replacement, if necessary, both a matter of a few minutes. This feature is of unusual importance and gives to the operator a familiarity and immediate control over the valve system. Other motors made by this company range in sizes from 3 to 75 h.p. and are made in one, two, four and six cylinders.

Pacific Coast Representative for Roberts Company.

J. T. Seely has recently been appointed special representative for the Roberts Motor Company, of Sandusky, Ohio. He may be reached at 781 Golden Gate Ave., San Francisco, and will cover the three Pacific Coast States of California, Oregon and Washington. A complete line of Roberts aviation, automobile, marine and stationary motors will be represented by Mr. Seely.

Aetna 1912 Catalogue.

The Aetna Brass Manufacturing Co., 4800-4810 Hamilton Ave., Cleveland, Ohio, have just issued their 1912 catalogue of Motor Boat Fittings. The book shows a complete line of Aetna world's famous speed wheels of various types made of Aetna bronze, steering wheels of the latest designs, electric fixtures and, in fact, a complete line of up-to-date motor boat fittings.



The Mianus factory—once and now.

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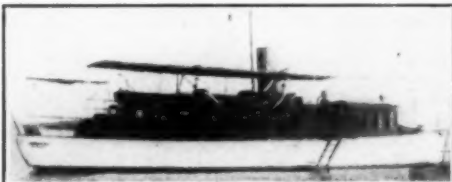
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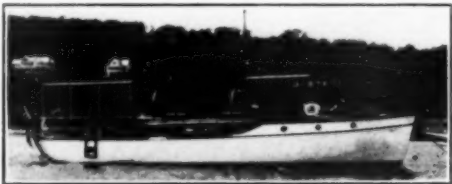
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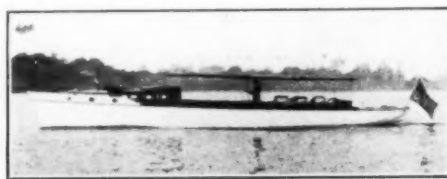
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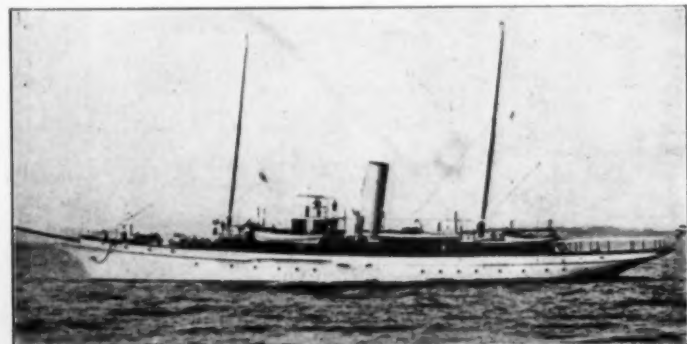
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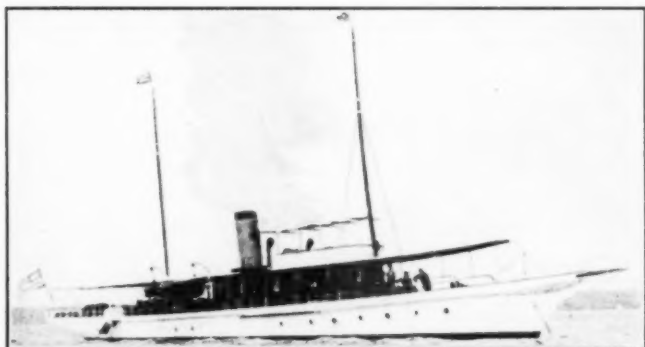
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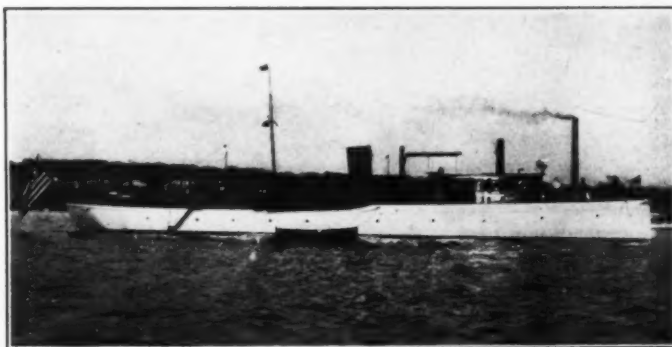
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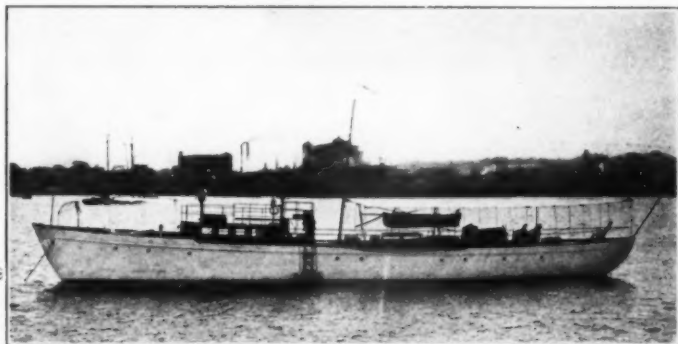
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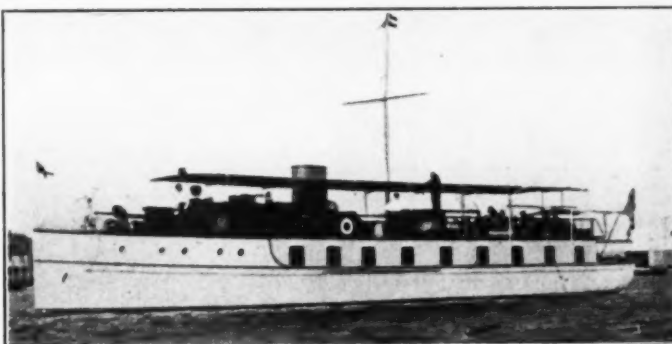
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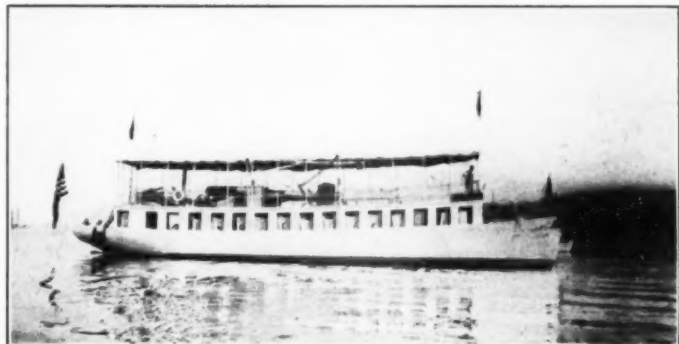
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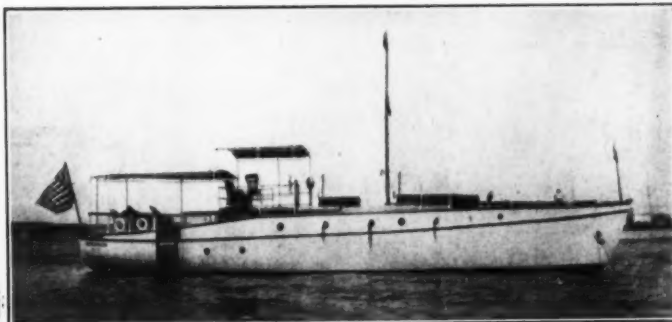
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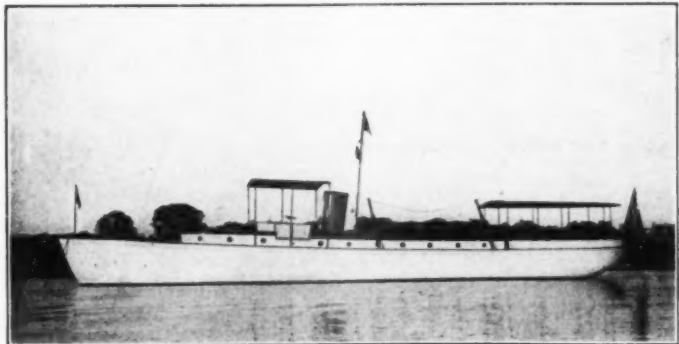
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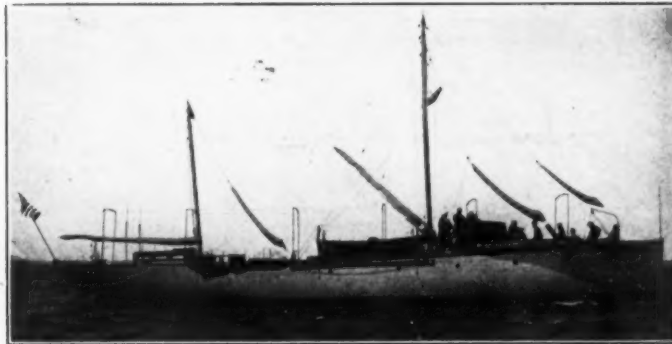
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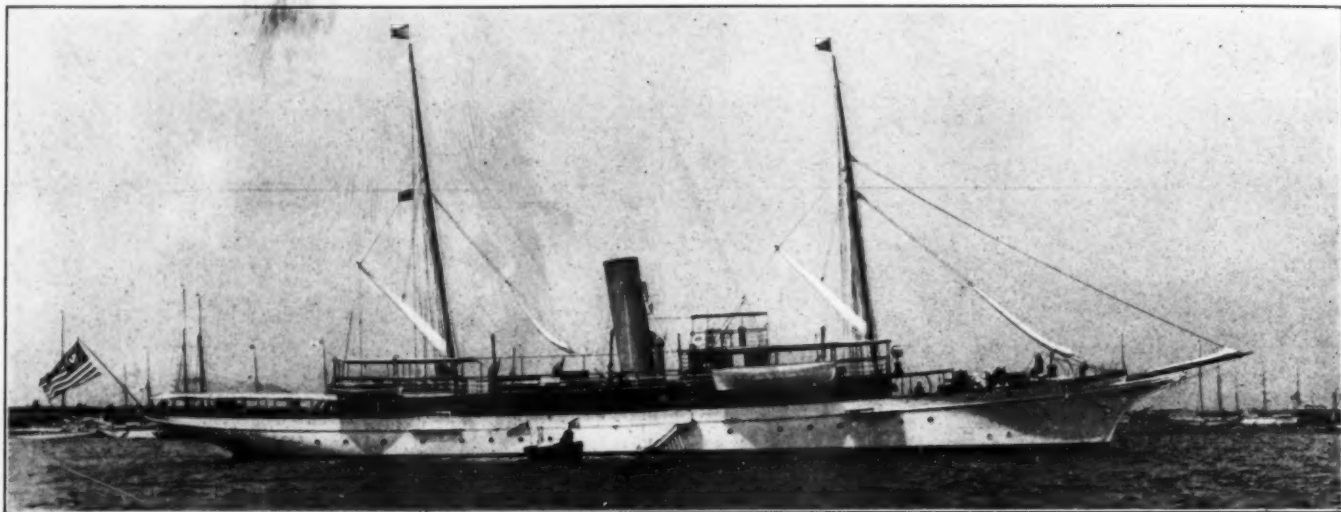
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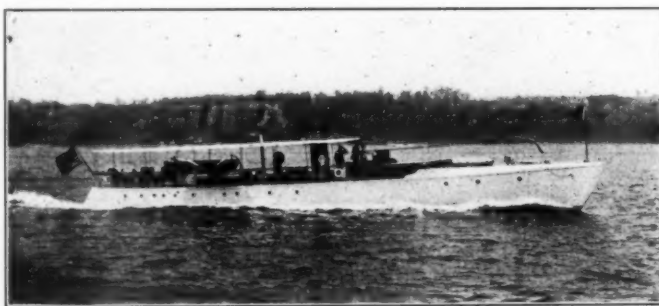
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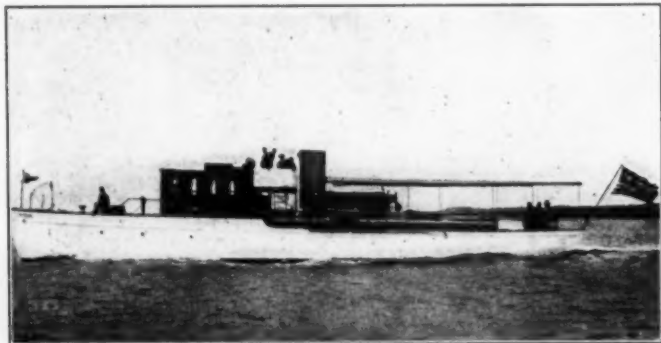
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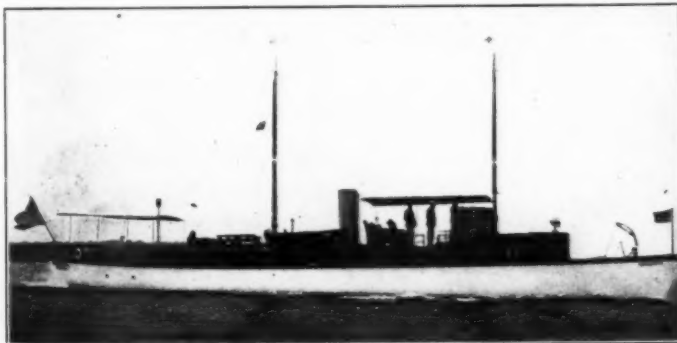
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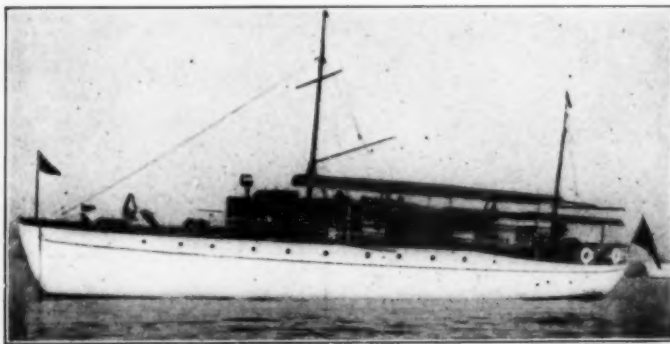
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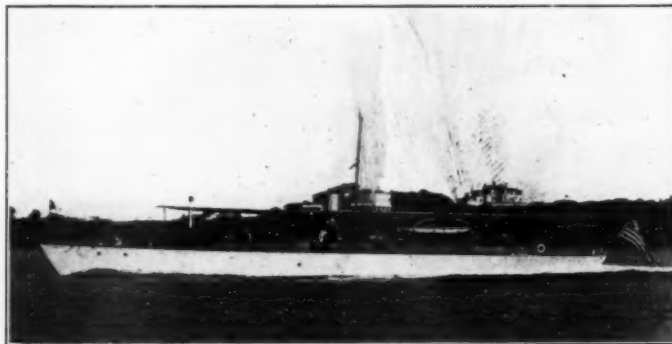
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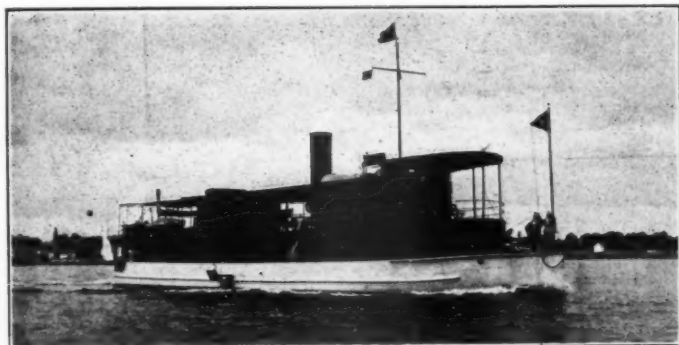
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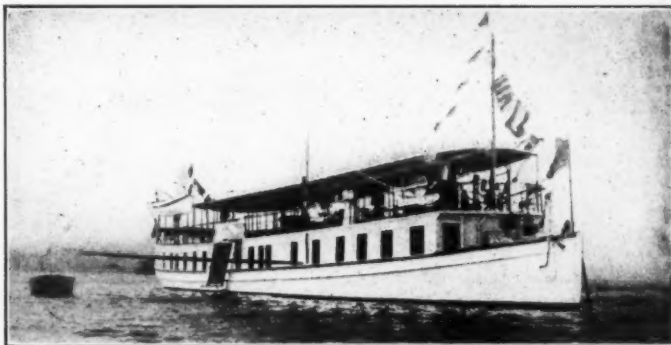
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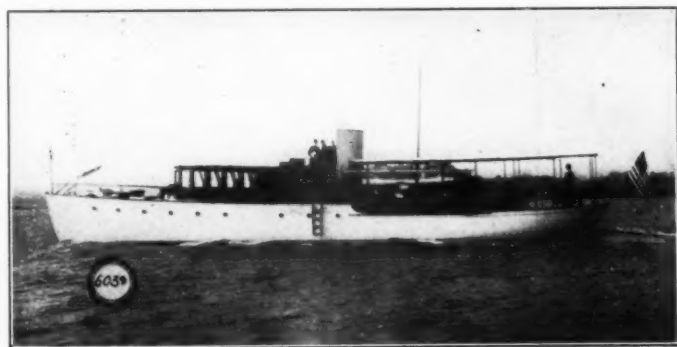
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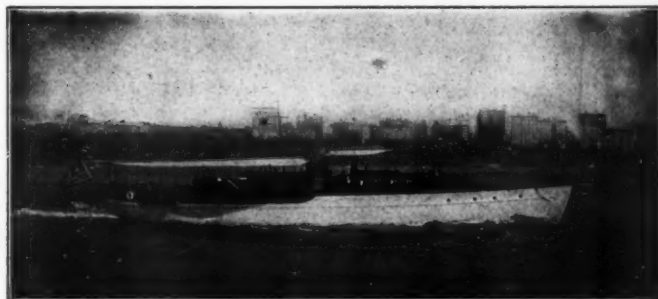
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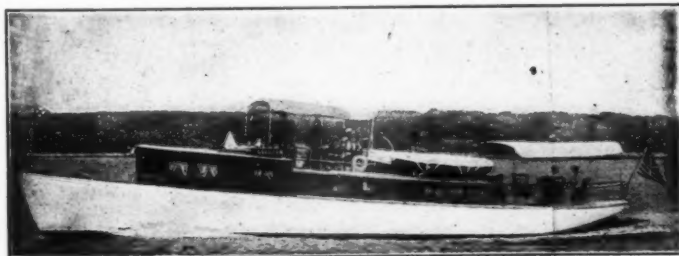
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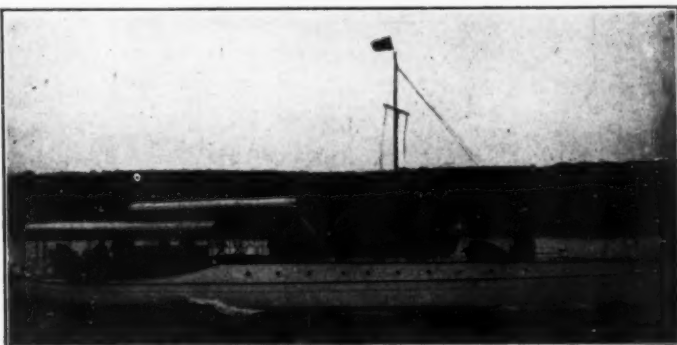
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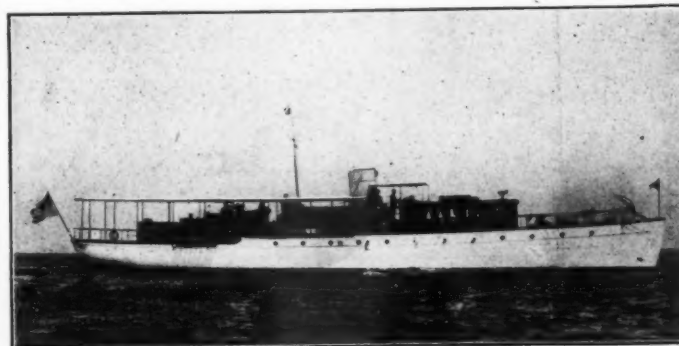
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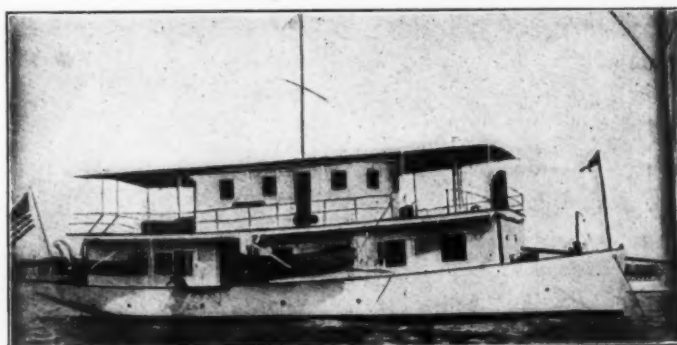
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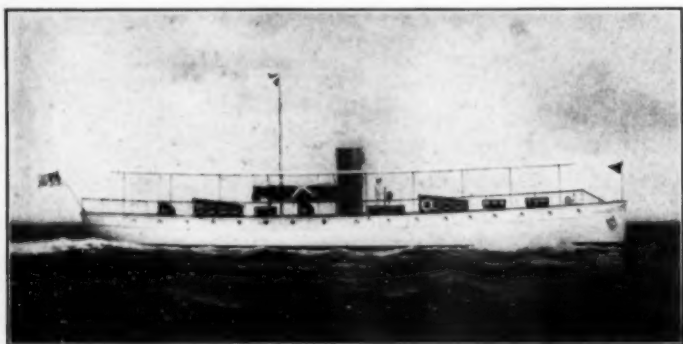
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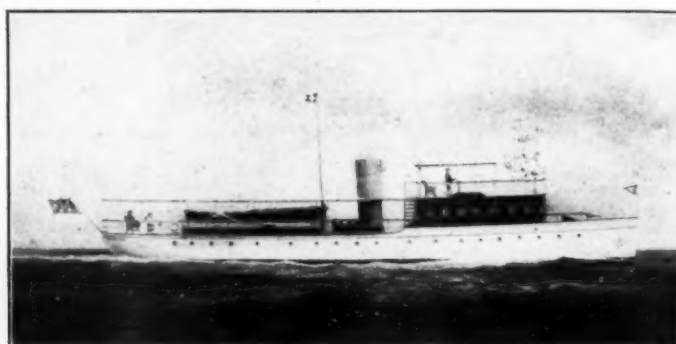
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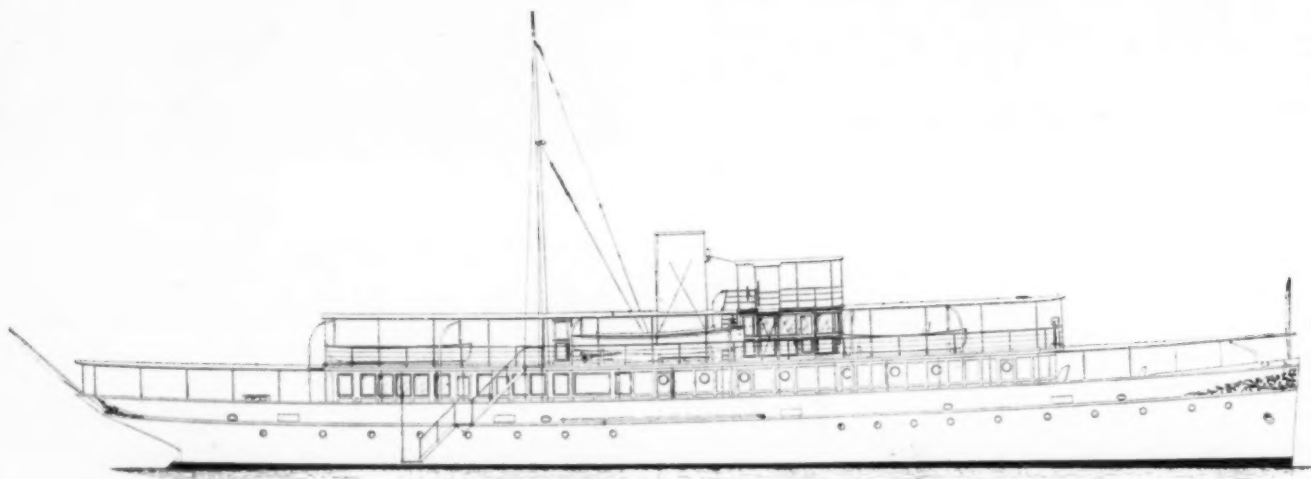
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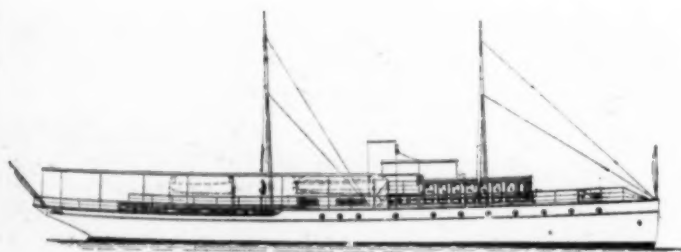
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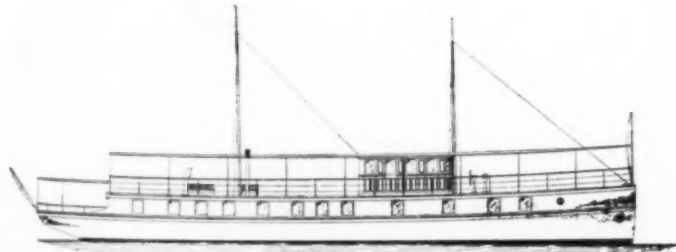
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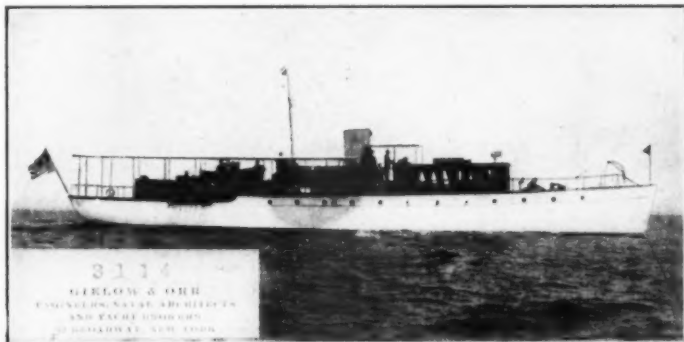
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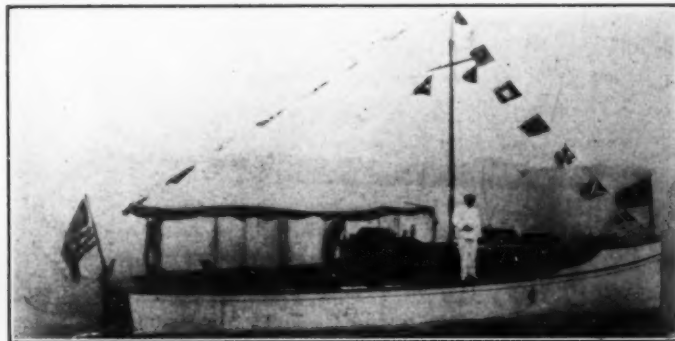
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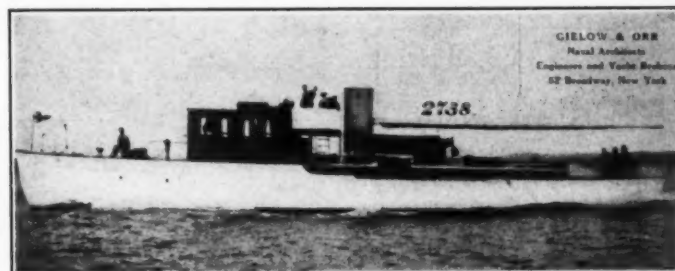
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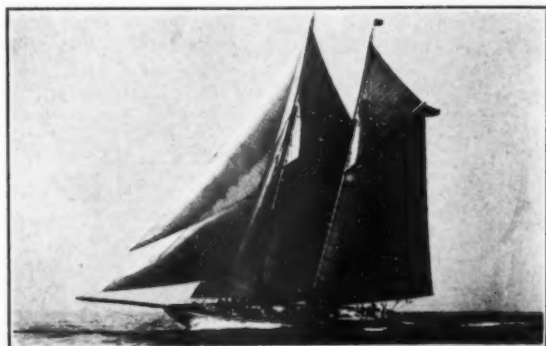
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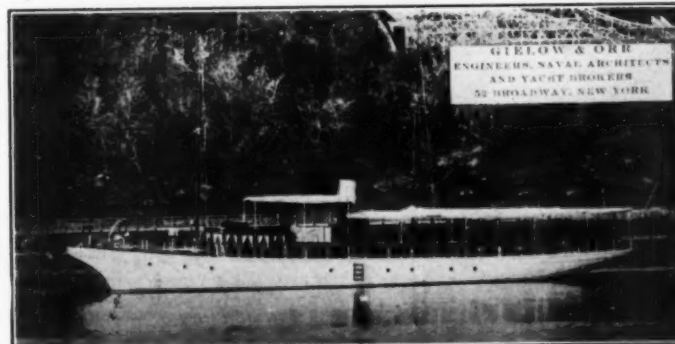
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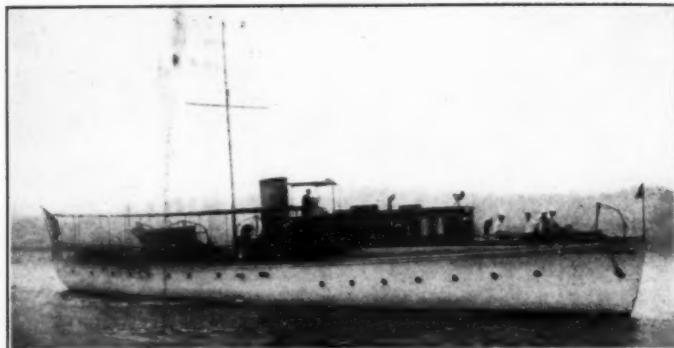
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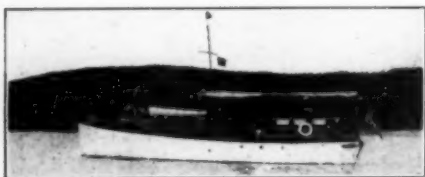
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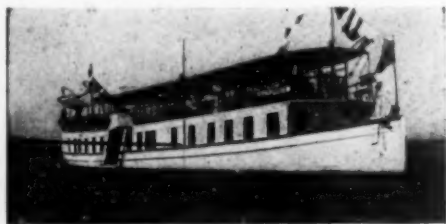
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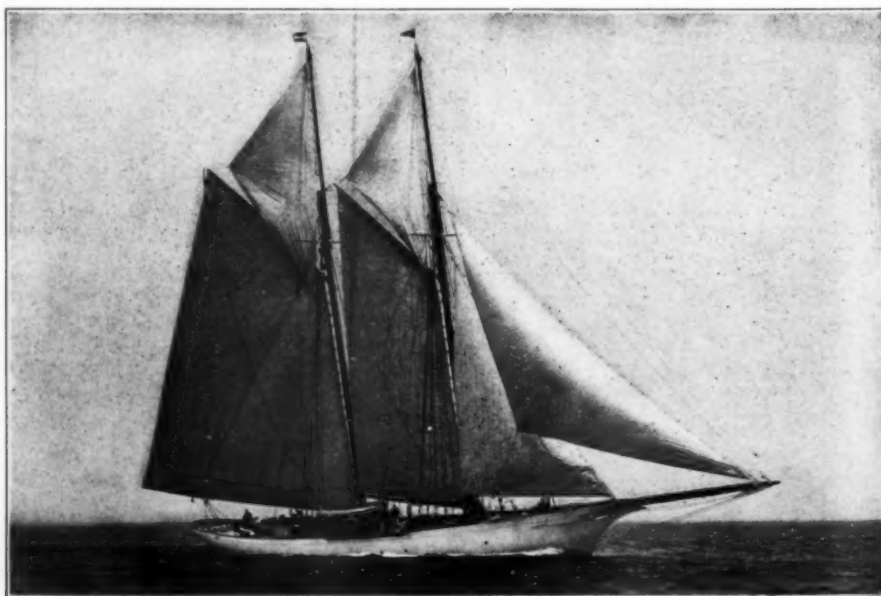
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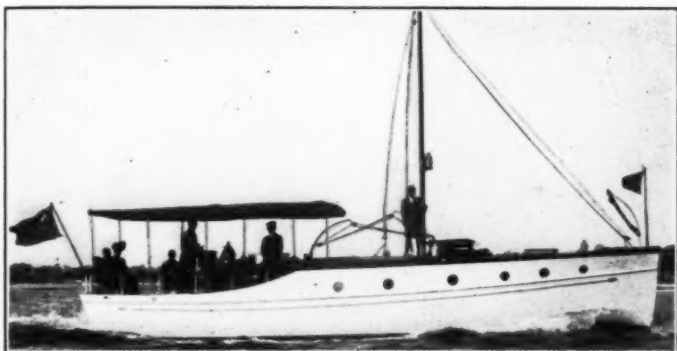
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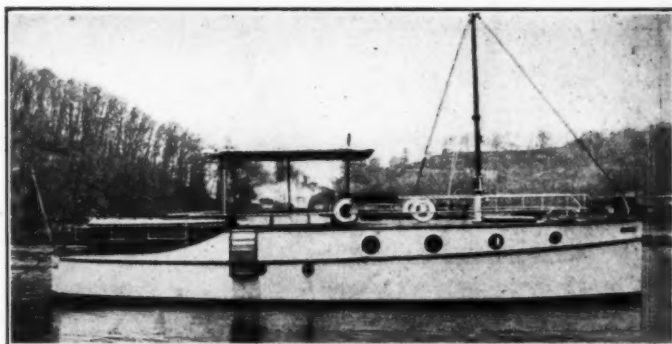
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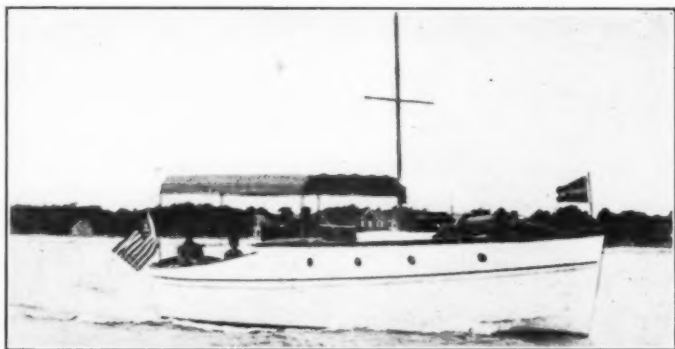
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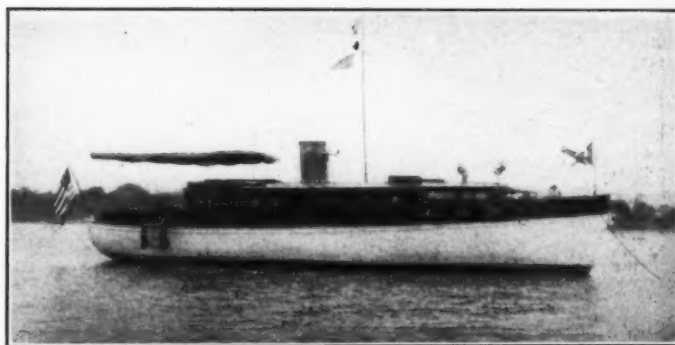
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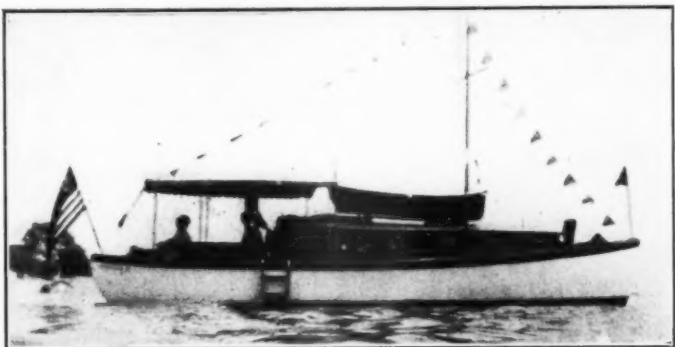
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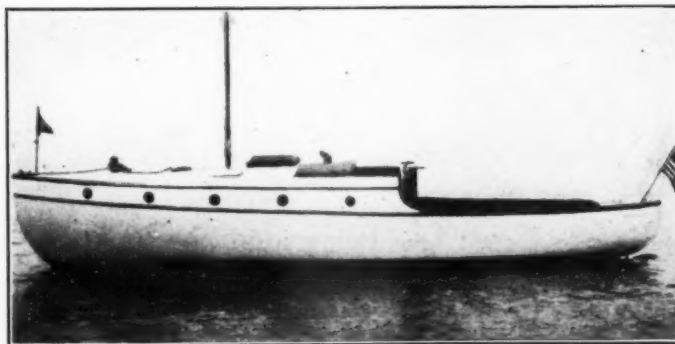
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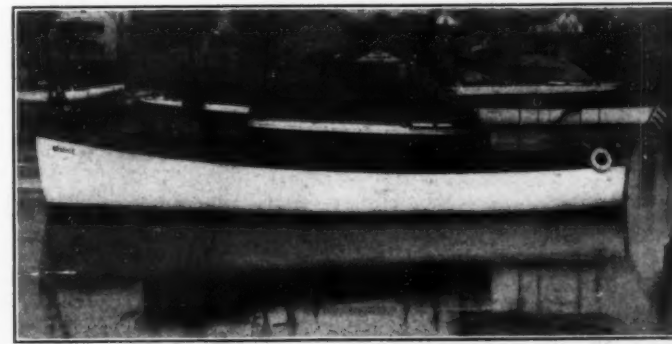
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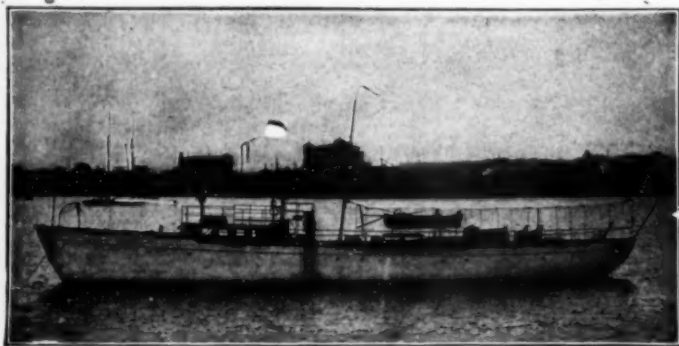
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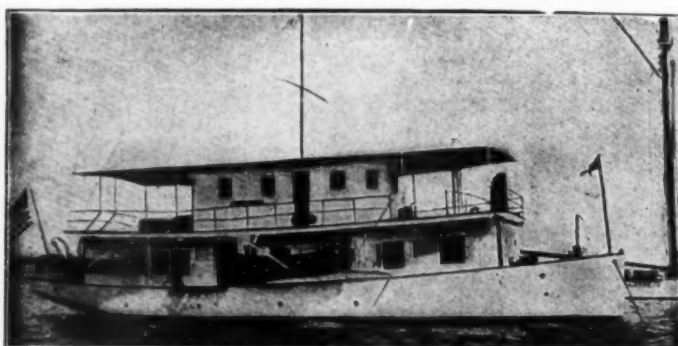
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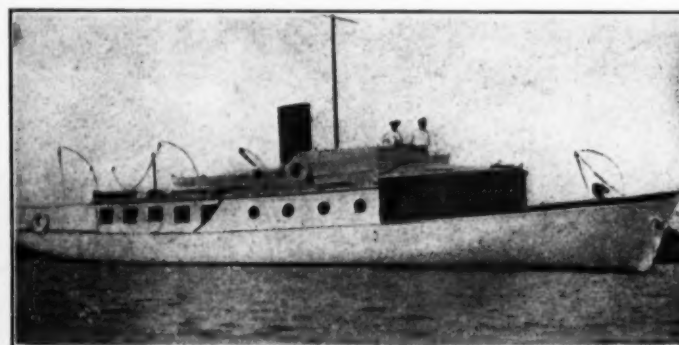
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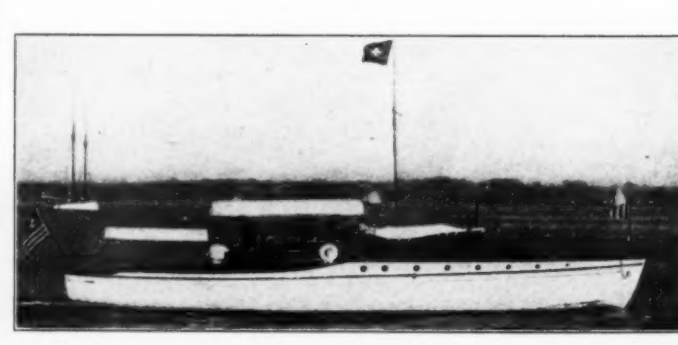
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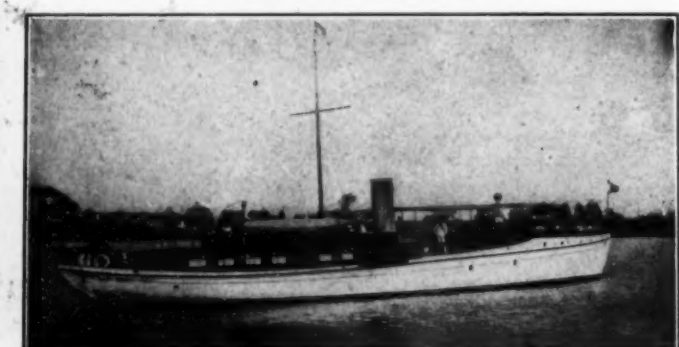
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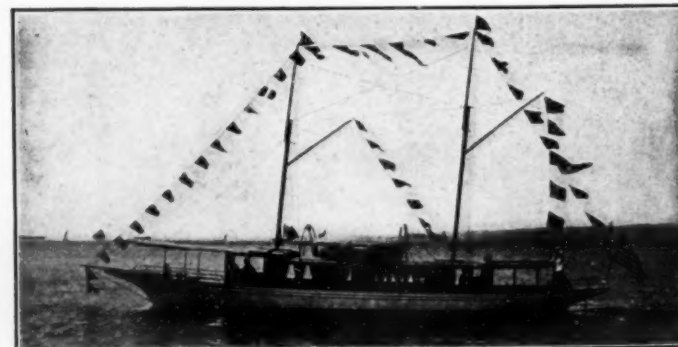
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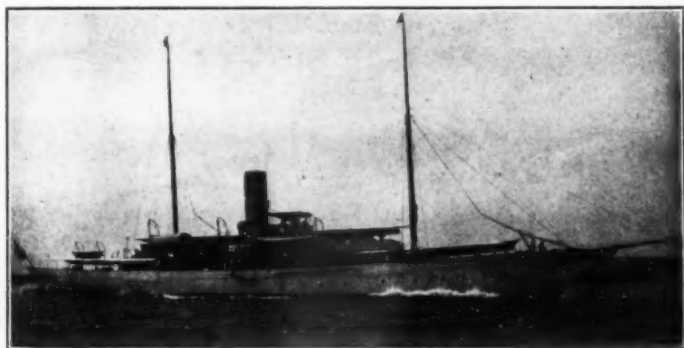
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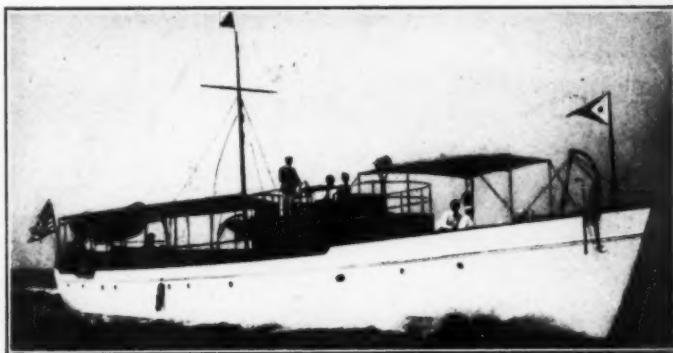
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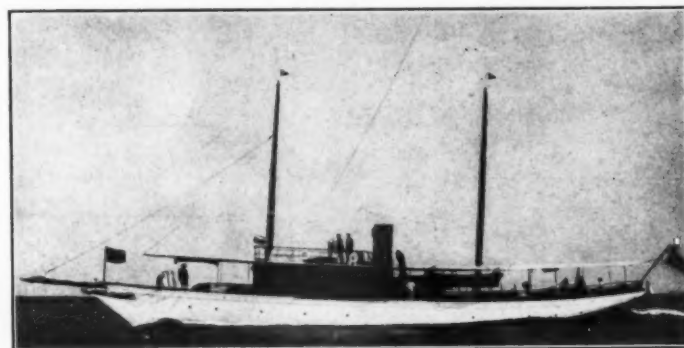
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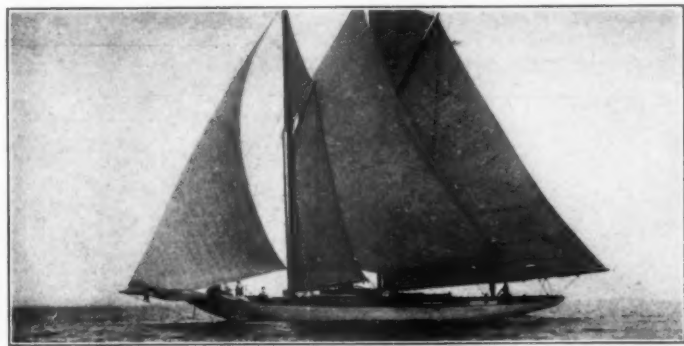
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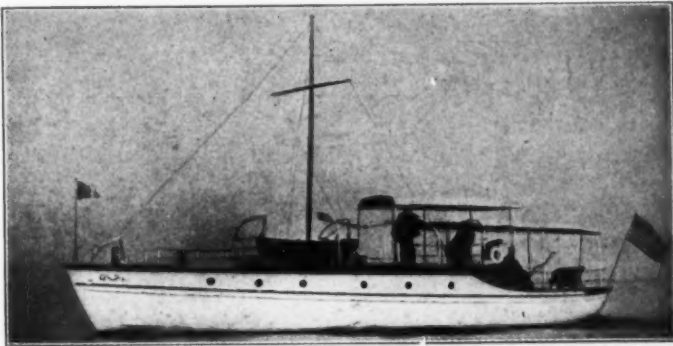
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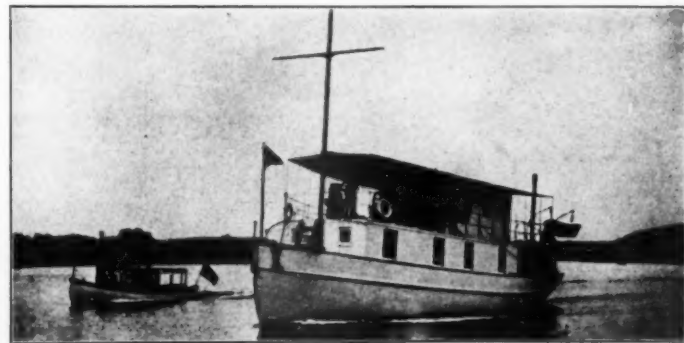
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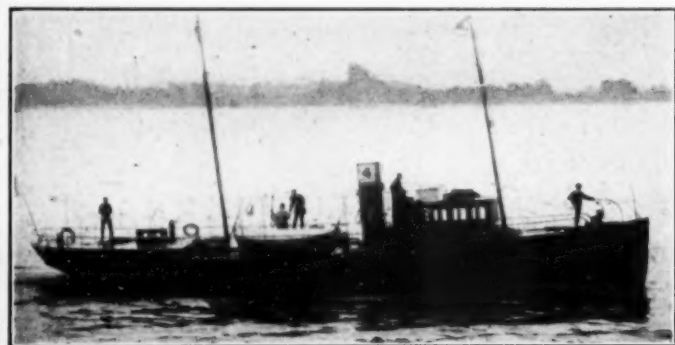
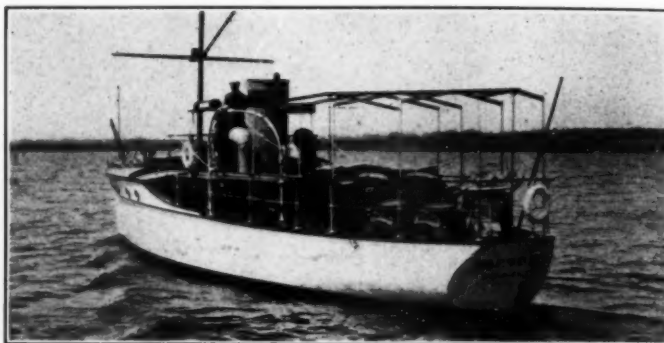
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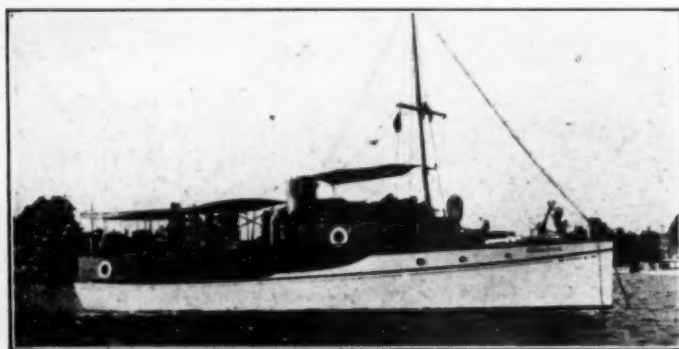
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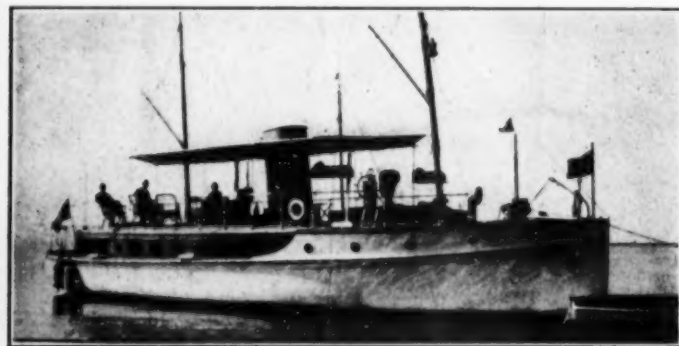
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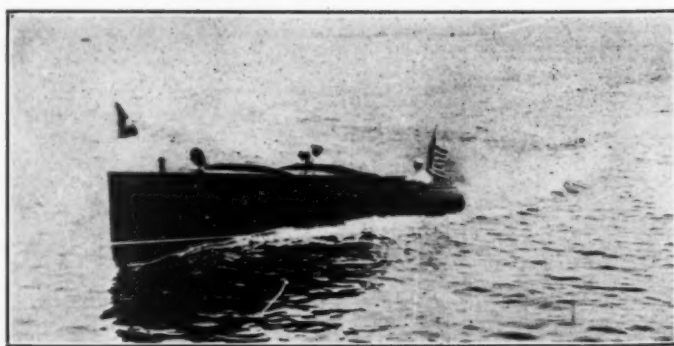
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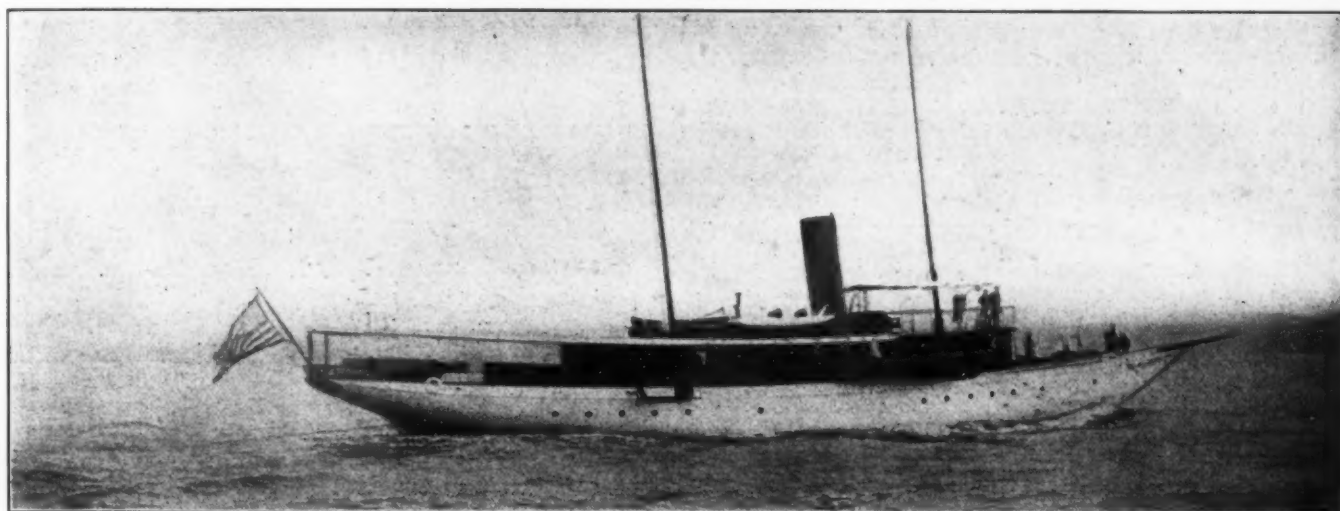
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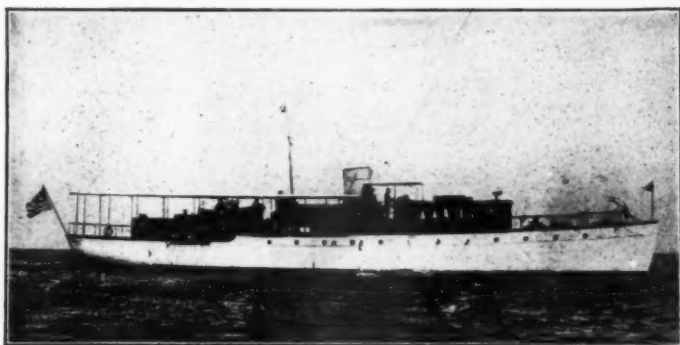
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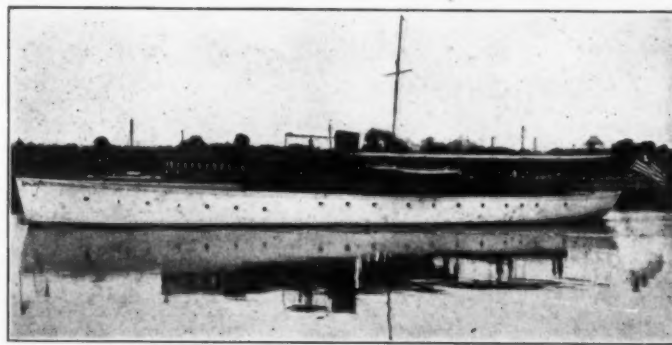
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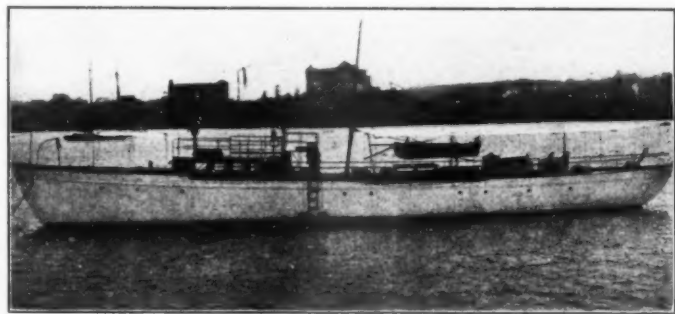
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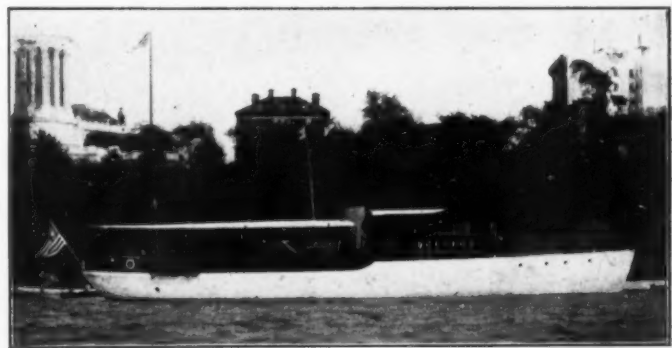
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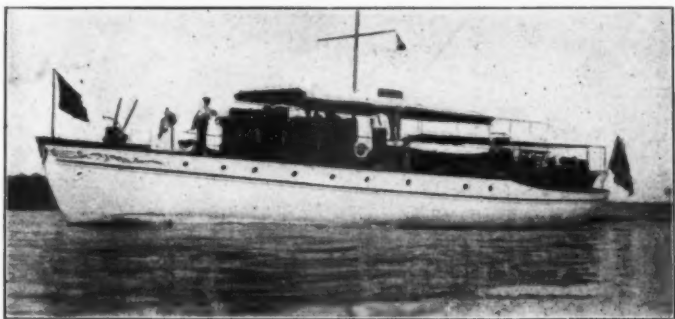
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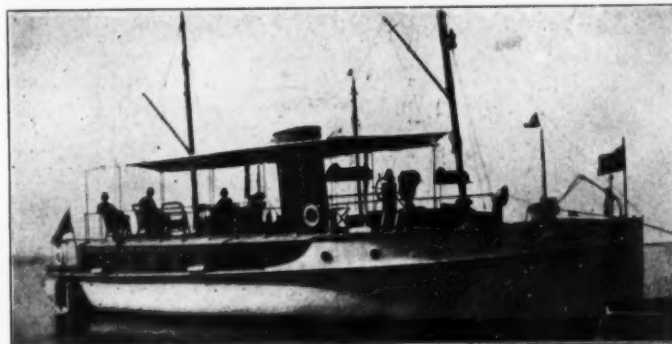
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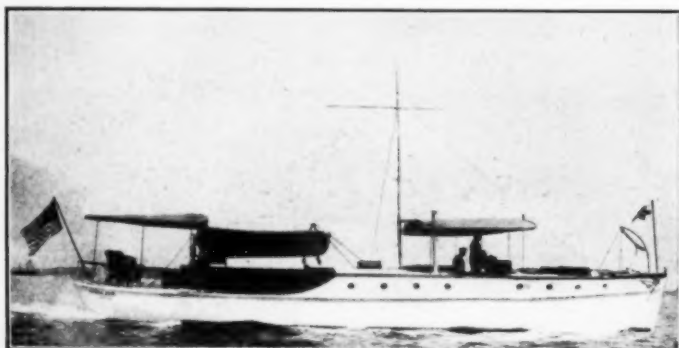
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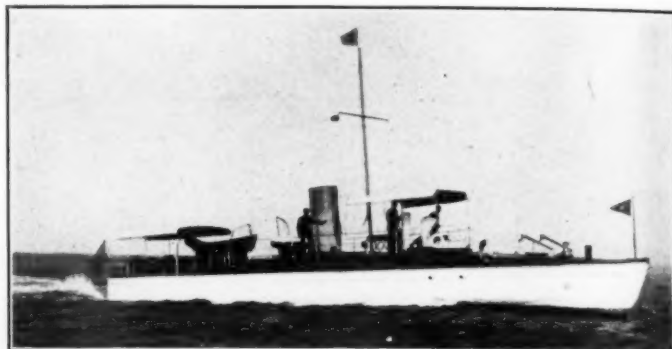
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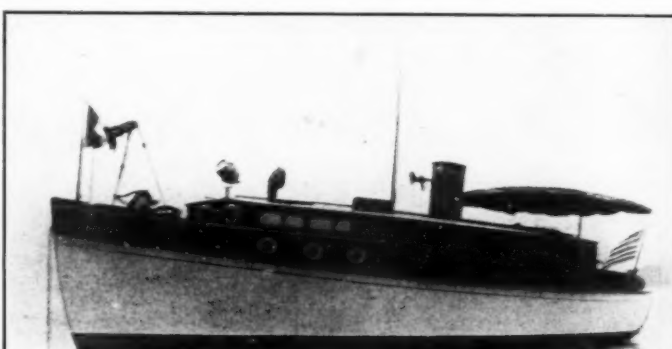
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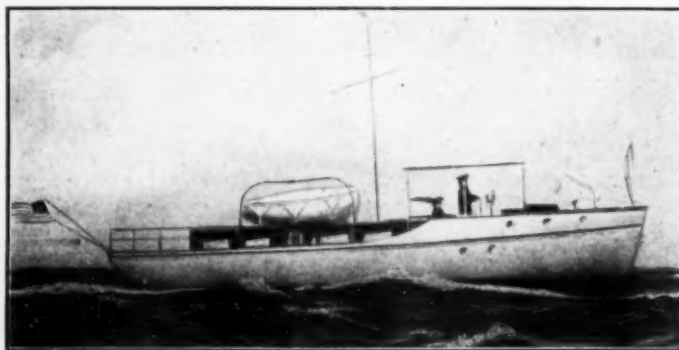
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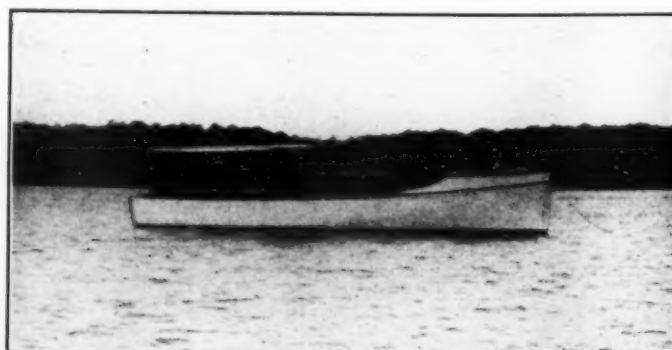
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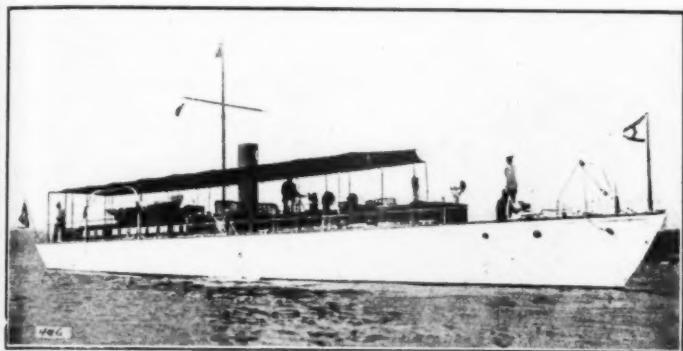
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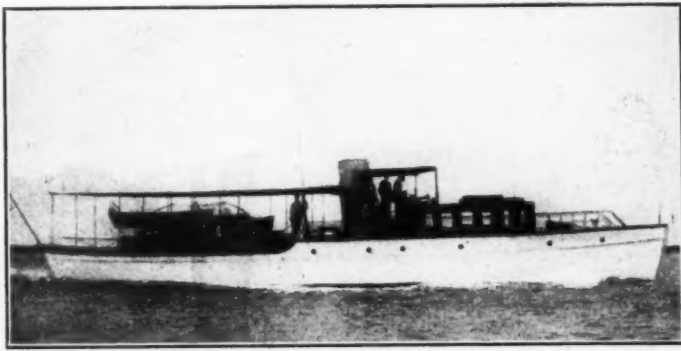
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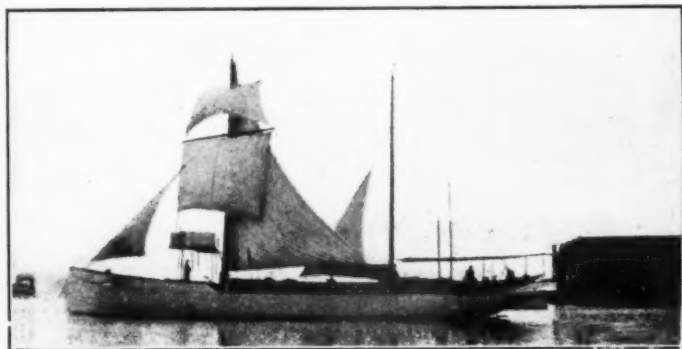
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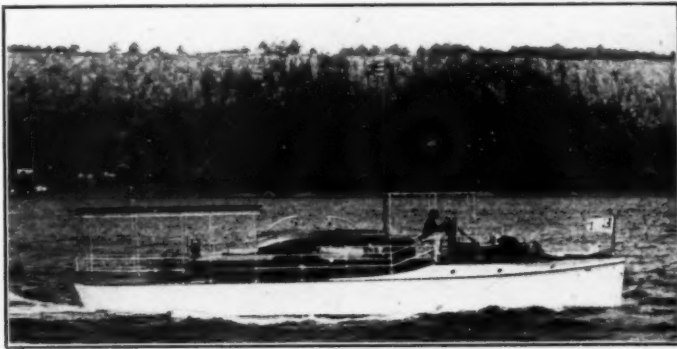
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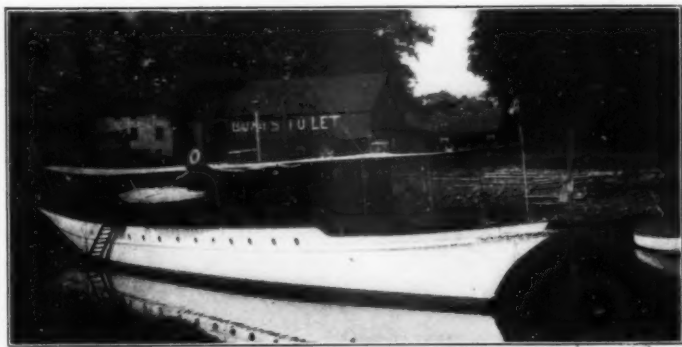
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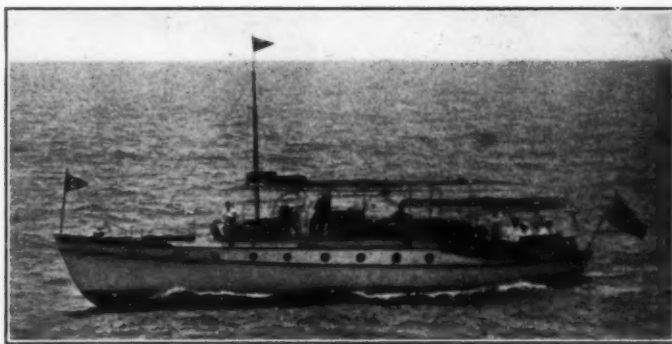
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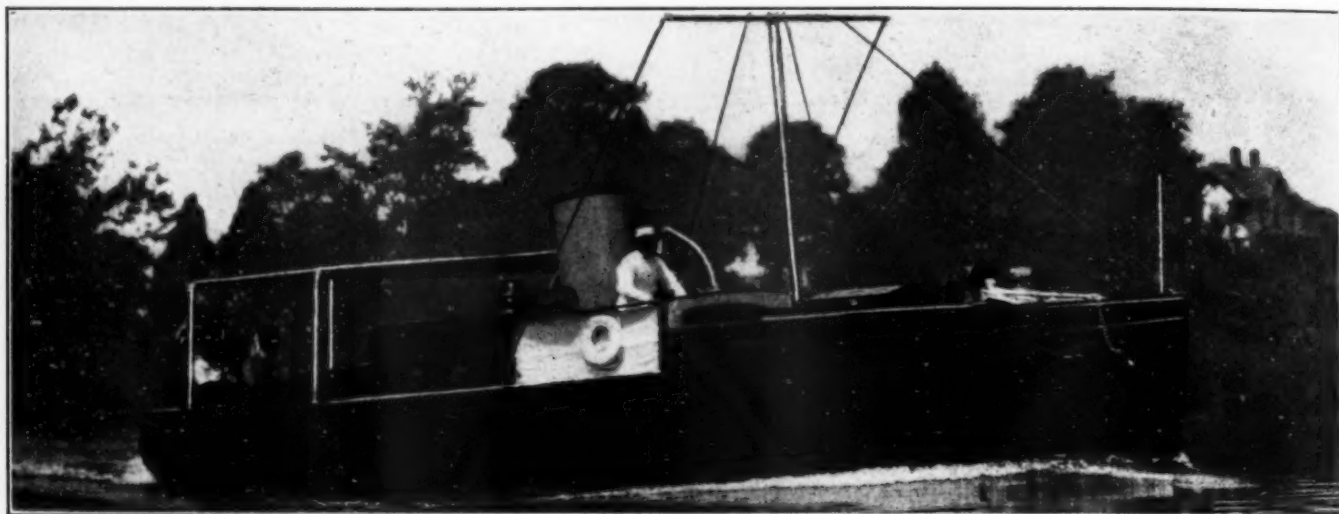
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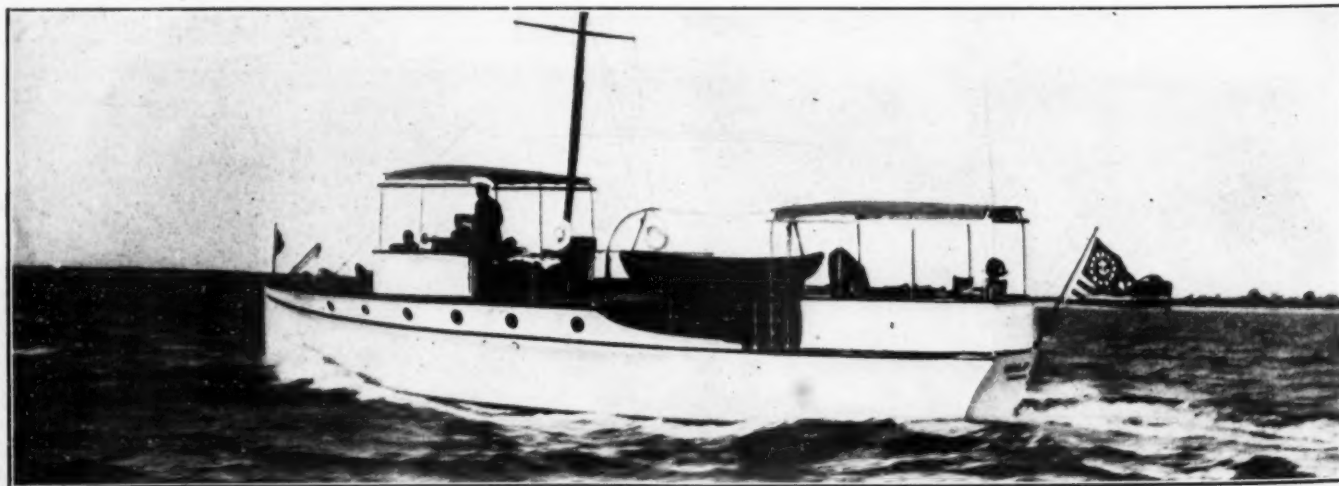
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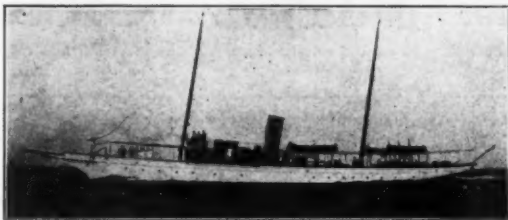
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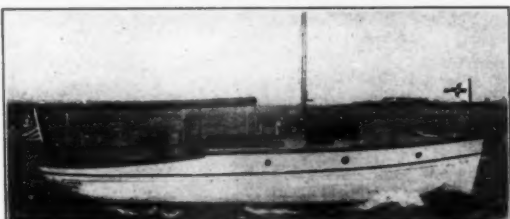
No. 639.—Latest type raised deck cruiser, 52 ft. x 48 ft. x 11 ft. x 4 ft.; built 1911; double stateroom, bath; sleeping accommodations for nine; Standard engine; speed 12 miles. Price reasonable. Charter considered.

Please mention MOTOR BOATING.



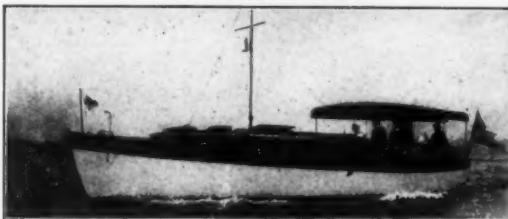
No. 400.—Steel steam yacht, 145 ft. x 117 ft. x 17 ft. x 7 ft.; four staterooms; elaborately furnished throughout; speed 16 miles.

Please mention MOTOR BOATING.



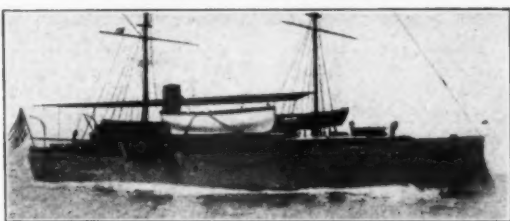
No. 390.—Handsome 30 ft. motor boat, built 1910; 12 H. P. Eagle engine; new 1911; extensive inventory; very roomy and able. Price attractive.

Please mention MOTOR BOATING.



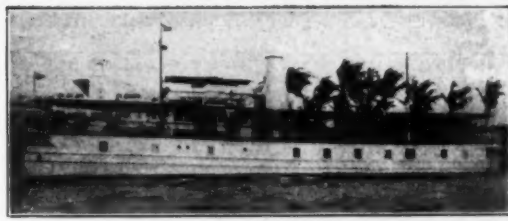
No. 474.—Desirable 40 ft. cruiser; built 1910; stateroom; complete inventory; exceptionally seaworthy; one man control. Price low.

Please mention MOTOR BOATING.



No. 526.—Unusually attractive motor cruiser, 67 ft. o. a., 13 ft. 6 in. beam, 5 ft. draught; built 1910; two double staterooms, large main cabin; Sterling engine; speed 12 miles.

Please mention MOTOR BOATING.



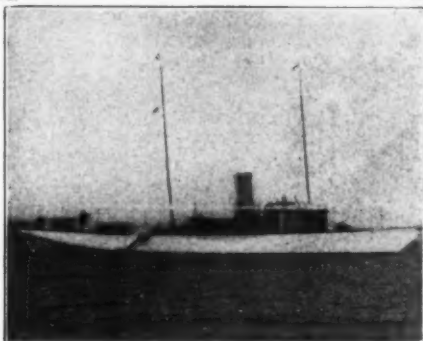
No. 551.—For Sale or Charter—Twin screw steam cruising house-boat, steel construction; six staterooms; four baths; every convenience; 116 ft. x 110 ft. x 21 ft. 4 in.; speed 10 miles.

Please mention MOTOR BOATING.



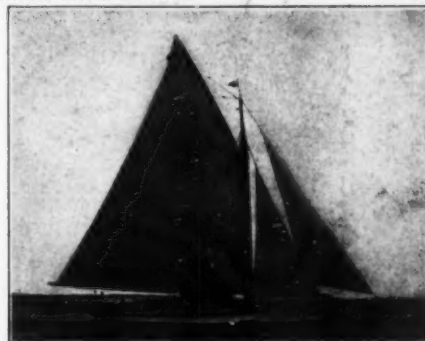
No. 416.—140 ft. steel steam auxiliary; five staterooms, two baths, three toilets; lavishly furnished; cruised extensively in foreign waters; available at very low figure.

Please mention MOTOR BOATING.



No. 591.—Attractive steel steam yacht, 94 ft. x 77 ft. x 14 ft. x 5 ft. 10 in.; three staterooms; speed 14 miles; excellent condition throughout. Price extremely reasonable.

Please mention MOTOR BOATING.



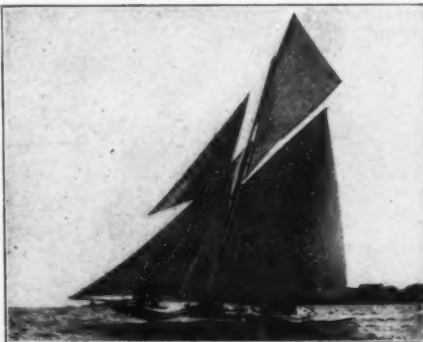
No. 380.—Very handsome cruising sloop; built by Lawley 1903; 49 ft. 4 in. x 30 ft. x 11 ft. 3 in. x 7 ft. 3 in.; teak trimmings outside, interior rich solid mahogany; two toilets; equipment most complete. Available at very reasonable figure.

Please mention MOTOR BOATING.



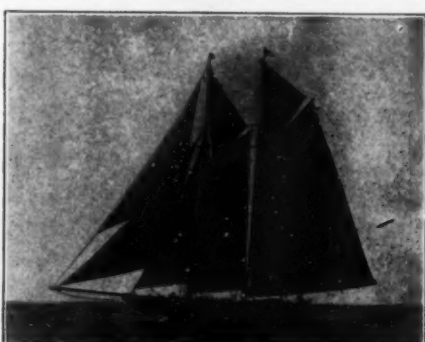
No. 641.—Fast Lawley sloop, built 1904; comb. keel and centerboard; two tons lead outside; 36 ft. 2 in. x 25 ft. 7 in. x 10 ft. x 4 ft.; toilet room and large galley; complete equipment. Price low.

Please mention MOTOR BOATING.



No. 652.—Very fast; Herreshoff composite keel sloop, 73 ft. 10 in. x 45 x 14 ft. 3 in. x 10 ft. 4 in.; built 1900; double stateroom aft; large main cabin; two toilets; sails new 1911; completely found; desirable for racing or cruising. Price very low.

Please mention MOTOR BOATING.



No. 472.—Cruising auxiliary schooner, 65 ft. x 43 ft. x 13 ft. x 9 ft.; built 1905; Craig engine, 1909; Ratsey sails; inventory complete; excellent cabin accommodations; remarkably fast and able. Price very low.

Please mention MOTOR BOATING.

Tarrytown Boat Works

Tarrytown, New York, U. S. A.

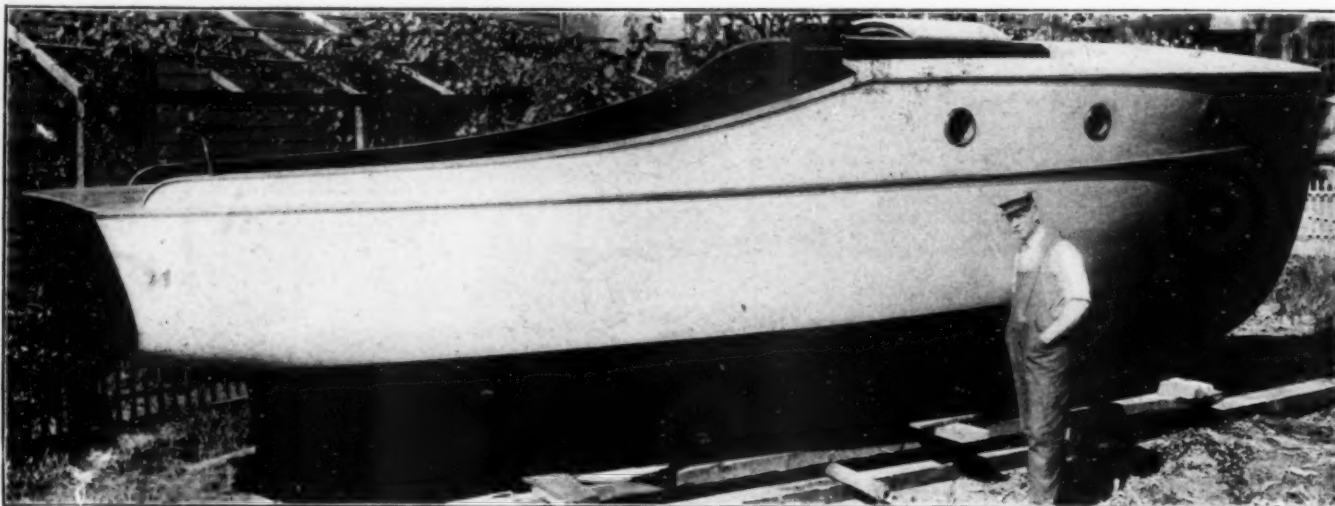
(One block from New York Central Rail Road Depot)

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Skilfully
Done
MOTORS
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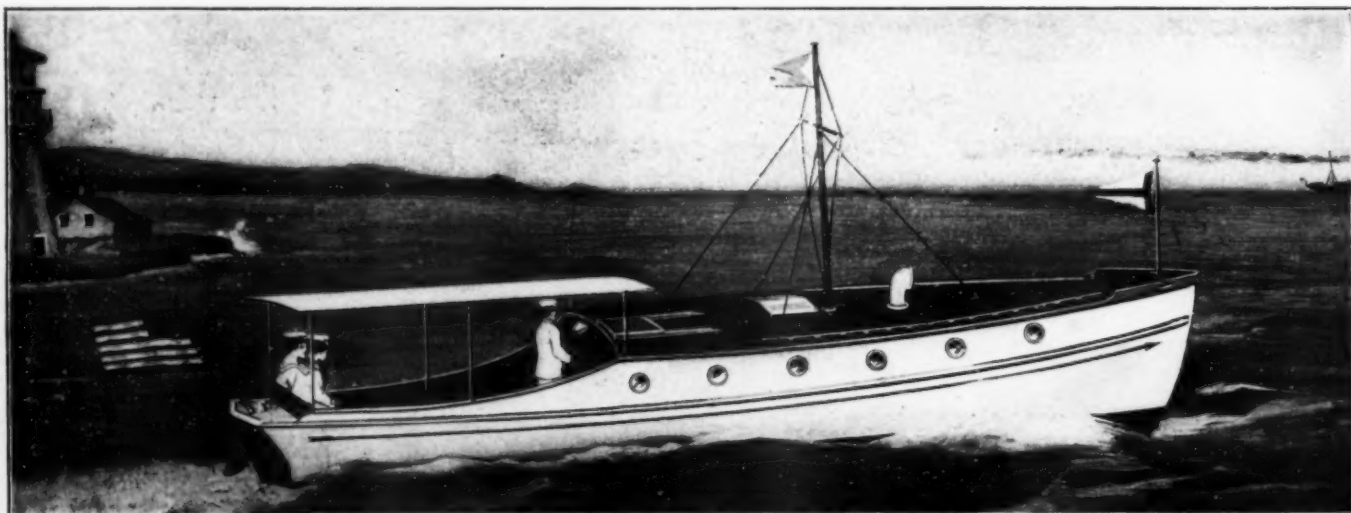
SPECIALISTS in designing and constructing
FINE CRUISING BOATS

ESTIMATES
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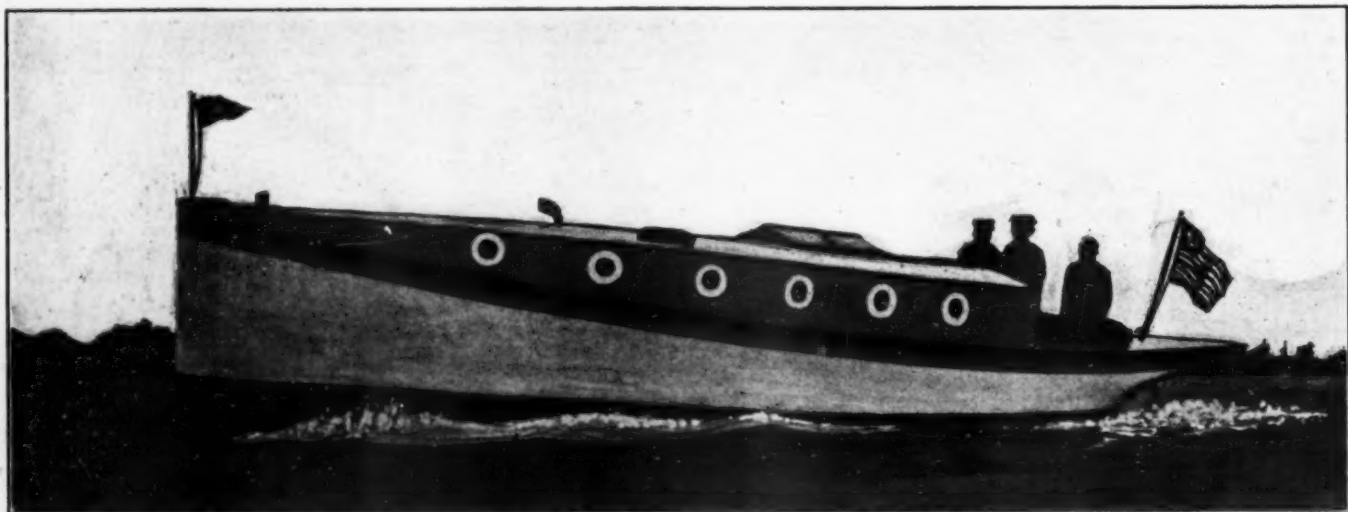
The success and beauty of the boats designed and built by us, is our best recommendation. Write us about what you want and we will be pleased to submit sketches and estimates.



Our latest design, 30 x 8-6; mahogany finish throughout; ready for delivery with any motor desired. Liberal discount before Jan. 1st.



This new 40 x 9 mahogany cabin cruiser, with 30 horse power, four cylinder, four cycle motor, Bosch ignition, \$3500. Complete plans and specifications mailed. Ready for delivery.



This staunch 40 x 9 cruiser used one season, 20 horse power motor. Will put in perfect order and sell for \$1,000. All above seen at factory.

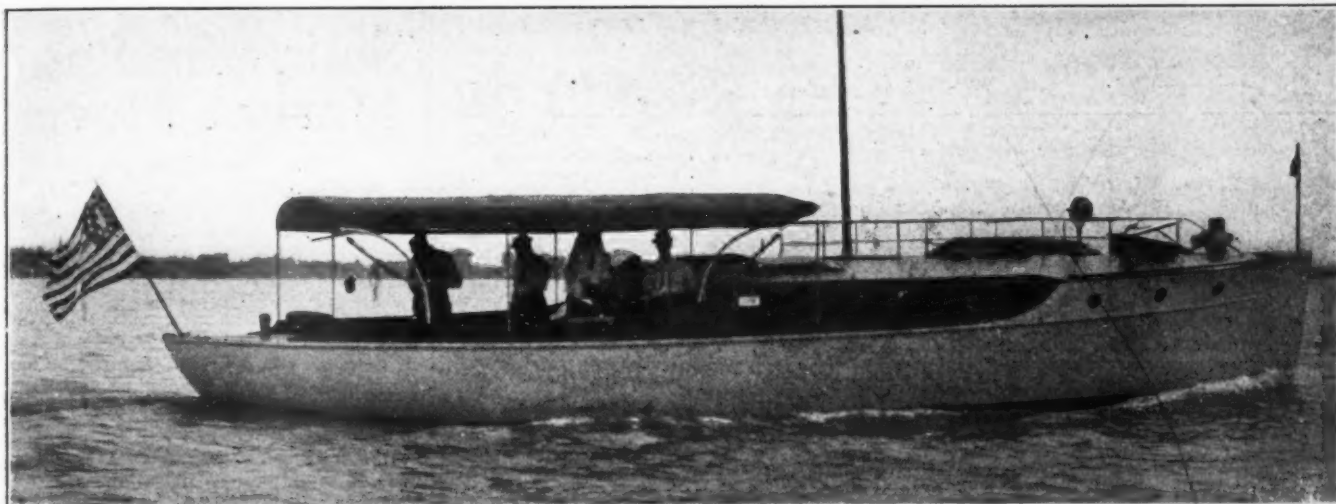
When writing to advertisers please mention MOTOR BOATING, the National Magazine of Motor Boating.

THE MOTOR BOATING MARKET PLACE

The rate for "For Sale" and "Want" advertisements is 3 cents per word. If an illustration is used the charge is as follows, which includes the making of the cut:
 Cut one inch deep, one column wide..... \$2
 Cut 1½ ins. deep, 1½ column wide..... \$3
 Cut three inches deep, three columns wide..... \$10

Opportunities for the Motor Boatman

Before you buy or before you sell examine the exceptional buying and selling opportunities under this heading. They comprise the best offers of the month. Please mention Motor Boating.



45 ft. x 10 ft. Matthews Florida cruiser. A rare opportunity to secure an unusually fine craft. Boat guaranteed in splendid condition. Boat fully found, and finished in African mahogany; sleeps six; all comforts for Florida service; 30 H. P. motor; electric plant; power tender; cost \$6,500; used three months; price attractive; owner building larger boat; do not delay; boat will be sold immediately. Address The Matthews Boat Company, Port Clinton, Ohio.

FOR SALE at reasonable price, one 300 H. P. six cylinder single acting reversible Standard engine. Has been in use one year and better than new. Reason for sale, am manufacturer of marine motors and am changing Standard for my own make. Also have one Standard lighting outfit in A1 shape. Will sell both together or separately as purchaser may require.
 W. E. SCRIPPS,
 SCRIPPS MOTOR CO.,
 631 Lincoln Ave., Detroit, Mich.

RARE BARGAINS.

We have a few 1911 models—brand new—which we are disposing of at remarkably low figure to make room for our new stock. No radical changes for 1912—merely a few refinements. The supply is limited and being sold rapidly. Order at once to avoid disappointment. For catalog and special bargain sheet, address

THE ROBERTS MOTOR CO.,

1501 Columbus Ave., Sandusky, Ohio.

KNOW THE TRUTH about the boat you intend to buy. At a reasonable fee we inspect and submit written reports on the condition of all types and sizes of hulls and machinery. Our work for the government should commend us to you. Whittelsey & Whittelsey, Naval Architects, Engineers, Inspectors and Appraisers, 11 Broadway, New York City. Tel. 4718 Rector.

MAGNIFICENT winter residence property in Florida for sale; will accept in part payment gasoline cruiser. Property at head of navigation on St. John's river, 600 feet frontage; river four miles wide at this point. Photograph, price and terms on request. A. W. Brown, Enterprise, Florida.

BARGAIN ON FAST RUNABOUT—21 x 3 ft. 8 in., seating capacity six persons; speed 18 miles with 20 H. P. motor; auto steering wheel; boat complete, ready for power; \$100 for quick sale. R. W. Angstrom, Feick Apt's, Sandusky, Ohio.

FOR SALE—One 6 H. P. type "F" single cylinder Fairbanks-Morse, two cycle marine engine; used less than one month; perfect condition; Schebler carburetor; \$75. A. G. Langworthy, 900 S. Wabash Ave., Chicago, Ill.

\$850 BUYS the best river cruiser ever built; 7 ft. wide, 34 ft. long, 25 ft. glass cabin. Erdix Rounds, Owensboro, Ky.

In the Market Place

MoToR Boating's Market Place columns offer the buyer and seller of used motor boats, fittings, etc., a quick and convenient medium of exchange.

ⒸIf you are getting a new boat or a new engine, and wish to sell the old one, don't have it rotting, or rusting or collecting storage charges—sell it—in the Market Place.

ⒸPerhaps you have water front property suitable for a yacht club, or for individual yachting enthusiasts—the Market Place goes to over 25,000 individuals interested in all pertaining to the water.

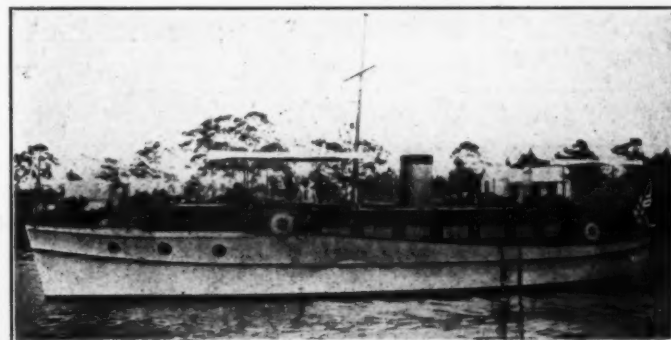
ⒸTry this Market—it is resultful.



FOR SALE—Very attractive modern motor boat, built in 1908; 38 feet over all; 10 feet beam and 3 feet draft; equipped with 24 H. P. Pearl motor, giving her a sustained speed of 8 knots an hour. Aft is flush quarter deck with ample room for six chairs. Cabin has two wide 12 foot transoms; stateroom on starboard side. Only reason for selling owner desires larger boat of same type. Inspectable near Boston. Apply to Hollis Burgess Yacht Agency, 15 Exchange St., Boston, Mass.



FOR SALE—No. 6413.—39 ft. cruiser; 9.10 beam, 2½ draft; launched 1909; bridge deck steering gear and engine control; cabin berths 4. Toilet; galley; headroom 6 ft. 3 in.; Acetylene light; 40 Lamp; speed 10 miles; complete and in full commission at Jacksonville, Fla. Ideal for Southern waters; guaranteed in perfect condition. Address Stanley M. Seaman, 220 Broadway, New York City.



No. 1446.—Unusual Bargain. Now in Florida. 53 x 10.6 x 3 ft. cruiser; launched last January. Speed 12 miles; 55 H.P. motor. Electric lights, bath, etc. In commission. Cox & Stevens, 15 William Street, New York.

USE "SNAPPER" ENGINES for your small boats. They are a big little engine, built by The Automatic Machine Co., Bridgeport, Conn.

WANTED—Trunk or raised deck cruiser, 28 to 30 feet; mahogany trim and nearly new; a bargain. C. T. Lamb, 91 Reid Ave., Brooklyn, N. Y.

A BIG BARGAIN.

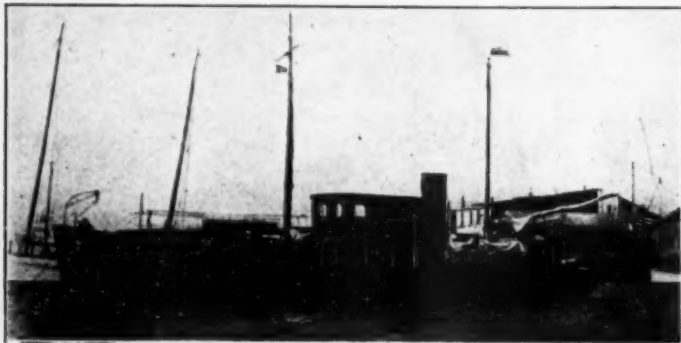
300 H.P. 1907 Standard engine, 6 cylinders, 12 x 14 single acting, air starting and reversing, assembled and ready to run. Engine as good as new. Has not been run over 1000 miles. Price \$2500. Act quick. Bruns, Kimball & Co., 134 Liberty St., New York City.

THE MOTOR BOATING MARKET PLACE

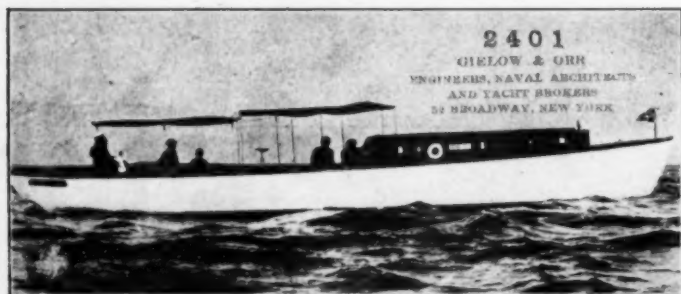
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Opportunities for the Motor Boatman

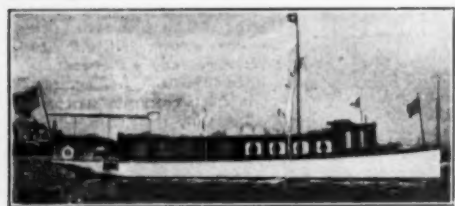
Before you buy or before you sell, examine the exceptional buying and selling opportunities under this heading. They comprise the best offers of the month. Please mention MoToR Boating.



No. 3458.—Exceptional bargain; 60 x 12 x 4.9 feet draught; hull copper sheathed; 50 H. P. motor. Pilot house, main cabin, stateroom, bathroom, 3 toilets. Owned by estate. Full particulars and permit for inspection, address Gielow & Orr, No. 52 Broadway, New York.



No. 2401.—For Sale—Lawley built hull, 53 x 10 x 3 ft. draught. An excellent boat for day cruising; has made 11 miles with 25 H. P. motor. Price reasonable. Gielow & Orr, 52 Broadway, New York.



NO. 670.—FOR SALE—Handsome gasoline launch, 55 ft. o. a., 47 ft. w. l., 9 ft. beam, 4 ft. draught. Built in very best manner. Equipped with a new 40 H. P. 4-cylinder Murray & Tregurtha engine; speed 11 knots. Comfortable cabin, 6 ft. 2 in. headroom, finished in mahogany throughout. Commodious pilot-house with two transom berths. Three berths in cabin, toilet, etc. Pine berth and transom in engine room. Roomy cockpit with deck chairs. Boat is tastefully fitted with cushions, curtains, etc. Carries tender on house. Has cruised many miles in comfort and safety. Reasonable price. Just the launch for a Southern cruise. Inspectable near Boston. Hollis Burgess Yacht Agency, 15 Exchange Street, Boston, Mass.



BEST BARGAIN OF THE YEAR—51 foot motor boat, 10 feet beam, 3 feet 10 inches draft; equipped with 25 H. P. Standard motor, giving speed of 10 1/2 miles an hour. This launch is of the modern raised deck type with a large cabin, 25 feet long with 6 feet headroom; watertight cockpit 20 feet long; four berths, toilet room; 3 anchors and cables, tender and complete equipment. Inspectable Rockland, Maine. Can be bought at a sacrifice price, less than half cost. Apply only to Hollis Burgess Yacht Agency, 15 Exchange St., Boston, Mass.

NEW 54 H. P., six-cylinder Elbridge engine, just from factory. Aluminum manifold, base and cylinder heads, extra finish throughout. Built for Mr. Coleman du Pont of Wilmington, Del.; exchanged for a larger power. Price \$700. Emerson Engine Co., Alexandria, Va.

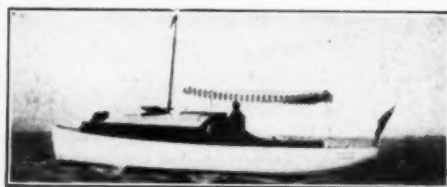
FOR SALE—Quantity of 4-cylinder, 4-cycle, water-cooled gasoline engines; 4 5/16 inch bore; 5 1/4-inch stroke. All aluminum base with two large doors on each side, making very easy of access to crank-shaft bearings. Owing to their long stroke they are specially well suited for use in boats and trucks. Entirely new, and will sell for \$175.00, with exhaust and intake manifold; geared pump put on. Add \$50.00 for Remy magneto, including brackets for attaching coil and timer. Flywheel furnished, \$8.00. Evansville Automobile Co., Evansville, Ind.

EVENING navigation course for sailing masters of motor boats and sailing craft cruising in lake, river, bay and sound; also day classes in seamanship, navigation, license preparatory, etc. Write for Booklet A, Y. M. C. A., 318 West 57th St., New York.



FOR SALE.

Houseboat. Length 70 feet. Draught 3 feet 9 in. Craig Motor 60 H. P. Speed 9 miles per hour. Can be seen at Halesite, L. I., N. Y. Address: W. E. LAWTON, Halesite, L. I.



FOR SALE—Hunting cabin cruising launch 39 feet 6 inches over all; 38 feet water line; 9 feet beam and 3 feet 6 inches draft. Comfortable cabin with 6 feet 2 inches headroom; 20 horse power Murray and Tregurtha engine, deck control, giving speed of 9 miles an hour. This is a very well constructed, comfortable cruising boat, fully equipped with cushions, lights, bedding, tableware, etc. Also a fine 12 ft. cedar tender, mahogany trimmed; 100 gallon gasoline tank; two 20 gallon water tanks; inspectable near Boston. For price and further particulars apply to Hollis Burgess Yacht Agency, 15 Exchange St., Boston, Mass.

SPECIAL TRADE LIST.

ACCESSORIES.
 L. B. Allen Co., Inc., 3517 Lincoln Street, Chicago, Ill.
 American Commercial Corp., 110 West Street, New York City.
 Geo. A. Cutter, Taunton, Mass.
 Fowler Lamp & Mfg. Co., 57 East 24th Street, Chicago, Ill.
 Phoenix Paint & Varnish Co., 124 Market Street, Philadelphia, Pa.
PARTS.
 The Dunbar Brothers Co., Bristol Conn.
 Sheridt's Manufacturing Co., Milwaukee, Wis.
COTTON DUCK CANVAS.
 Lowell Weaving Company, Lowell, Mass.

WATERPROOF CLOTH.
 Fabrikoid Works, Newburgh, N. Y.
IGNITION.
 Fahnstock Electric Co., 120 Patchen Ave., Brooklyn, N. Y.
BOAT BUILDERS.
 Kyle & Purdy, Inc., City Island, N. Y.
MOTORS.
 Acadia Gas Engine Co., Ltd., Bridgewater, Nova Scotia.
FLAG POLES.
 Novelty Manufacturing Co., Waterbury, Conn.
METAL STAMPING.
 The Chandler Co., Inc., Springfield, Mass.

When writing to advertisers please mention MOTOR BOATING, the National Magazine of Motor Boating.

Sell It In The Market Place

**What have you got
for sale?**

**What do you want
to buy?**

Every motor boatman, every yacht owner, sooner or later has something to sell—something for which he has no further use—a boat, an engine, some equipment or other marine article that is just as good for service as ever. The fact that he no longer needs it does not diminish its value to the man who has a use for something of the kind.

There is a good customer looking for every article which is in serviceable condition. The question is to find that customer. That is what MoToR Boating's Market Place is for.

MoToR Boating has a guaranteed circulation in excess of 25,000 copies per issue, and every copy is seen by several persons. In this way practically every motor boat enthusiast in the country is reached, as well as the principal foreign markets. In this great audience there are sure to be several prospective customers for every article you want to sell.

When a man is looking for a certain article he naturally refers to the place where he will be most likely to find what he wants. Thousands of readers know of the bargains that are always listed in MoToR Boating's Market Place, so they look here first.

Successful advertisers follow the same course as those who are looking for something—they place their advertisements where they are most likely to be seen by prospective buyers.

The fact that this Market Place sells goods is proven by the following letter from a man who sold a \$1600 cruiser from one appearance of a forty-five word advertisement that cost \$1.35.

MoToR Boating,

Gentlemen—Received eight answers to this ad from Indiana, Virginia, Massachusetts and New York. Have sold the cruiser—could have sold two more like it. Have my check for the boat—here is yours for the ad—and my thanks. Yours truly,

(Signed) R. H. STERN.

The rates for these Market Place advertisements are printed at the top of this page. The cost of selling whatever you have will be less than the annoyance and the storage expense of having it around.

If you have anything you want to sell, send us your advertisement at once, so that it will appear in the next issue. Use sufficient space to describe your article attractively, so the buyer will know whether he wants it.

We will write the advertisement if you will send full information and tell the amount of space you wish used.

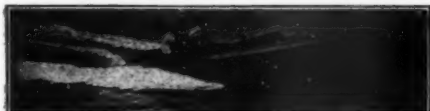
NAVAL ARCHITECTS & YACHT BROKERS

Have A Model First

Yacht Owners and Naval Architects

A Model often saves its cost in suggesting desired changes before building is commenced. A handsome ornament for home, office or club. Our models are unexcelled in quality of workmanship and perfection of detail. Prices moderate. Investigate.

The B. A. B. MODEL & MFG. CO., 675 Hudson St.
New York City
Phone 1110 Chelsea.



Piste II—The most successful 21 footer—Speed, Seaworthiness, Comfort and Simplicity. Amateurs can build my original "V" bottom boats. Send stamp for illustrated circular of designs.

WILLIAM H. HAND, JR., Naval Architect, New Bedford, Mass.

WM. W. MILLER

Yacht Designer and Builder

MARINE RAILWAY
STORAGE REPAIRS

River Street, CHARLOTTE, N. Y.



ARTHUR BINNEY

Successor to EDWARD BURGESS

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Vason Building, 70 Kilby Street, Boston, Mass.

Agent for The Standard Marine Motor, The Commercial Acetylene Co. (Safety Storage System.)

TELEPHONES:

Office, 2782, Main.

Residence, 3023-3, Brookline.

YACHT BROKERAGE DEPARTMENT

Commission on Sales, 5 per Cent. Commission on Charters, 10 per Cent.

B. B. CROWNINSHIELD

R. N. BURBANK

Naval Architects and Engineers
Yacht and Ship Brokers

31 State Street Boston, Mass.

COX & STEVENS

Engineers and Naval Architects,
Yacht Brokers

15 WILLIAM STREET NEW YORK CITY
Telephone 1375 Broad

KROGMAN & PURDY

Yacht and Ship Brokers

HIGH GRADE YACHTS OF ALL TYPES
FOR SALE AND CHARTER

92 State Street, Boston, Mass.

Correspondence Invited Particulars Furnished

BOWES & MOWER

Naval Architects and Engineers
Yacht and Vessel Brokers

Offices, Lafayette Bldg., Chestnut and Fifth Streets

Bell Phone PHILADELPHIA, PA. Cable Bomo

JAMES CRAIG

807-841 Garfield Ave. Jersey City, N. J.
Tel. 2237 Bergen.

DESIGNER AND CONSTRUCTOR OF
MARINE GASOLINE ENGINES AND
SPECIAL MECHANISMS, SEVEN TO
THREE HUNDRED HORSEPOWER

Long vs. Short Stroke.

(Continued from page 38.)

of fuel in the gas engine are expended as follows: Losses through exhaust, friction, radiation and the balance for useful power. If the losses enumerated above be decreased the efficiency will be correspondingly increased. With the long stroke motor, with smaller piston for a given power, the compression can be increased over that of the short stroke type, and the gases expanded to a greater degree. The more gases are expanded within the cylinder the less heat will be lost through the exhaust and the pressure of exhaust gases will be lower. We can readily see that less heat units are lost through the exhaust of long stroke motors which points to higher thermal efficiency for this type.

All moving parts, except the pistons in the short stroke motor of a given power, must move faster and this, together with the greater number of reversals of motion of the reciprocating members, per given unit of time, must cause more wear. Since the thrust from the piston of larger diameter in the short stroke type is transmitted to a crank of shorter radius, the shock due to the rapid combustion of gases, is far greater than in the long stroke engine of equal power.

Increasing the stroke of a modern "square" motor increases the power in proportion and it will have as long life with only a slight increase in weight. Increasing the piston speed of the "square" motor to that of the longer stroke will not produce the same results since more power will be expended in opening larger valves against greater pressure and in turning the motor itself.

This discussion refers principally to the four-cycle type of engine as the length of stroke in relation to bore in the two-cycle type is largely limited by the arrangement of ports performing the valve functions.

The center of gravity in the long stroke machine is somewhat higher, which is an objection in a marine motor. However, the advantages in favor of the long stroke are of far greater importance.

The question naturally arises as to how much the stroke may be increased in relation to bore and still increase the mechanical and thermal efficiency of the motor. It is my opinion that a stroke 25 to 50 per cent. greater in length than the diameter of bore will produce the best results. WM. G. MILLER, Ironwood, Mich.

Helen E. the Frontispiece.

Helen E. shown in the frontispiece of this issue, is owned by O. C. Sandorn, Boston, Mass. She was designed by Fred D. Lawley and built by Geo. Lawley & Son, Corp., of Neponset, Mass. She is the highest development of the high speed day cruiser, having a 50 ft. over all length, a beam of 8 ft., and a 2 ft. 6 in. draft. Her power plant consists of two 6-cylinder 60-70 h.p., Lamb high speed motors of the latest model.

* THEODORE D. WELLS *
* Naval Architect and Marine Engineer *
* 32 Broadway, New York. Tel. Broad 6737 *
* A Specialty of Steam Yachts, Power Boats and Sailing Yachts. *
* Successor to H. C. WINTINGHAM and *
* WINTINGHAM AND WELLS. *

NAVAL ARCHITECTS & YACHT BROKERS

FREDERIC S. NOCK

NAVAL ARCHITECT AND YACHT BUILDER

MARINE RAILWAYS, STORAGE, REPAIRS

EAST GREENWICH

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NAVAL ARCHITECTS AND ENGINEERS

11 BROADWAY

NEW YORK, N.Y.



L. E. GEARY

Naval Architect, Engineer and Broker

Steel, wood and composite yachts and commercial vessels
designed and construction supervised.

203 Grand Trunk Pacific Dock
SEATTLE



Tel. Lombard 289

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Naval Architects and Engineers

Yacht and Vessel Brokers

Office: 107-108 BROWN BROS. BUILDING

PHILADELPHIA

225 CHESTNUT STREET

DOWNEY SHIPYARD & MARINE COMPANY

Yachts, Steam or Sail, and Motor Boats

Built, Repaired, Bought, Sold, Chartered

SHIPYARD, Marine Construction and Repair Dept.,

23rd and 24th Streets and 3rd Ave., Brooklyn, N. Y.

NEW YORK OFFICE, 30 CHURCH STREET

Cable Address "Downeyard," New York

Eastern Motor Sales Co.

DESIGNERS—BUILDERS

HYDROPLANE SPECIALISTS

MARINE MOTORS OF ALL TYPES

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Shops Bay 44th St., Gravesend Beach

NEW YORK JERSEY CITY BAYONNA

BRUNS KIMBALL & CO., Inc.

132 Liberty St., New York

Phone, 2614 Rector

THE LARGEST and MOST RELIABLE

MARINE AGENTS and YACHT BROKERS

Send for bargain list of first-class second hand engines or boats

Engine Installing : : Yacht Repairing

GIELOW & ORR

Naval Architects, Engineers and Brokers

Marine Insurance

52 BROADWAY, NEW YORK, N. Y.

Telephone 4678 Broad

Plans, Specifications and Estimates furnished for all requirements
Descriptions and Photos submitted upon receipt of inquiry.

THE WORLD'S CHAMPION

SAND BURR II

ADOLPH APEL, Designer & Builder, Ventnor, Atlantic City, N. J.

Improved design for 1912. Guaranteed Speed up to 50 miles per hour

OR NO SALE

Furthermore: Absolute seaworthiness, safe, durable, free from spray at any speed in fair waters. Comfortable seating for 4 to 6 persons. Special guarantee for low rating on the 1912 A. P. B. Ass. rules.

Prices on application.



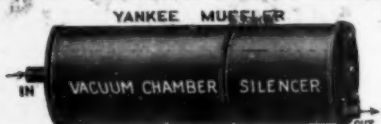
B.M. C. Co., 25-foot Hydro. 25 Miles 30 H.P.

HAND-HOMER-BATH MARINE CONSTRUCTION CO. V-BOTTOMS

Simple for an amateur to build. Knock down or complete boats as desired.

Prices reasonable.

A. P. HOMER, 159 State St., Boston
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The Motor Boat Industry

(Continued from page 3.)

plished only by practical experience, but it is admitted by all that the principle has great possibilities, and today manufacturers are offering boats of this class with guaranteed speed of 40 miles an hour. With the development of the hydroplane there will also follow the further development of the high-powered, light-weight motor, for which the demand has never been so great as at present.

At present I consider that 40 feet is about the limit in length that can be successfully standardized in the cruising line. Above this length many conditions enter into the design, details of construction and equipment that have to be met in filling the requirements of the customer.

The private motor yacht above 50 feet in length will probably always be built to order, although, year by year, the designs even in this type of boat are gradually narrowing down to accepted types which both the builders and the public from past experience have found to be most suitable and practical for their several branches of service.

In a motor yacht, more than anywhere else one must appreciate certain limitations, and as the owners, with each succeeding year, demand more comfortable accommodations, the only solution that can be given is either to reduce the total accommodations for guest or increase the size of the boat.

With the increase in size and tonnage of boats, which has been noticeable from year to year, the development of high-powered internal combustion engines has received more and more attention, and one of the most interesting developments in this line is the engine adapted for the use of heavy oil, commonly called the Diesel type engine. The Diesel engine probably will not compete for some time with the gasoline engine in units of less than 100 horsepower, but for higher powers, this engine has a tremendous field, due to its low cost of operation.

While it is of comparatively recent development in this country, the engine is in no sense experimental, and a number of well-known firms in Europe have been building engines of this type for several years, and the success of the engines has been amply demonstrated by the number which have been built and placed in practical use in various parts of Europe, where they are now employed for the propulsion of many types of vessels for both commercial and naval service.

With the perfection of this new type of prime mover, the field of the power-driven vessel is enormously increased, and those who have studied the situation have come to the conclusion that these engines will soon supplant the smaller steam plants, as they occupy less space and are more economical in operation.

Engines of this type are already being offered in this country in units of 2,000 brake horsepower, while still larger units are now under construction abroad.

A further indication of the growth and condition of the motor boat industry is shown by the overwhelming interest taken in the Eighth Annual Motor Boat Show, which will be held in New York at the 69th Regiment Armory, from February 17th to 24th, under the auspices of the National Association of Engine and Boat Manufacturers, which represents over 90 per cent. of the companies interested in the motor boat industry.

Cruise of the Polar Bear.

(Continued from page 5.)

evidently taken place earlier this season.

Continuing northward, the Polar Bear proceeded to Walrus Island in the famous Pripiloff group in Bering Sea. Here birds were found so thick that the investigators had difficulty in moving about. It was impossible to walk without stepping on the eggs. Prof. Bent counted 28 different varieties of birds on this island, which is noted for its seal rookeries. While the moving picture machine was in operation

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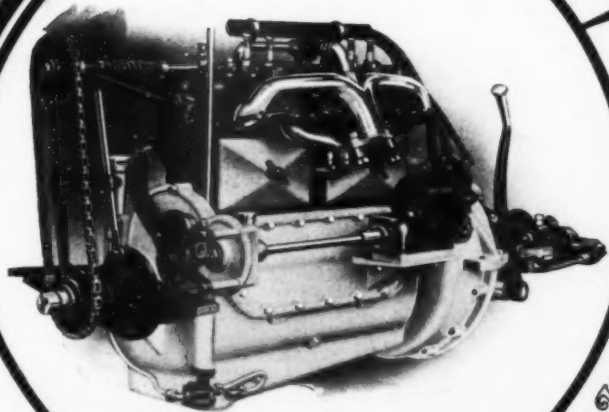
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This Glue is made expressly for use in combination with calico between the double planking of diagonally built row boats and motor boats. Melt the Glue, and paint it on the first series of planks with a stiff wire-bound brush; the calico should then be laid on and ironed through; another coating of glue should be painted over, taking care to well cover the calico; after that put on the outside longitudinal planking, and apply the copper rivets in the usual way. The boat will then be found to be perfectly water-tight, and the Glue will expand and contract with the timbers without cracking.

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at rookeries, two immense specimens of hair seal, standing as high as a man, rose near the machine and engaged in a bloody battle to the death, all of which was recorded on the invaluable film. While the operator was turning the crank of his machine, a number of small seals, who had not learned to fear the hunter, played about the tripod of the machine, and threatened to overturn it.

Crossing the 60th degree of latitude on the northward journey a stop was made at St. Matthew Island. This isolated isle was overrun with game, and Capt. Lane and Mr. Kleinschmidt went bird hunting. No sooner would a wounded or dead bird fall to the ground when a fox would dart out and seize it. It was a stay adventurous.

From Nome the Polar Bear passed through Bering Strait into the Arctic and turned to the Northwest, skirting the Siberian Coast, and finally reached her destination, Wrangel Island, which is in latitude 72°N., longitude 180°W. It was at Wrangel Island that Capt. Lane's prize story of adventure found its source. This was the capture of the white polar bear-cub which rattles the bars of its cage on the deck of the Polar Bear. The Captain and a few members of his party had gone into the interior of the island near Doubtful Harbor, when they came upon a mother bear and cub. After an exciting chase the bear was killed and when a rope had been obtained from the schooner, the cub was captured alive and brought struggling aboard the vessel. At Cape Blossom three bears were shot.

Before leaving the Arctic, Captain Lane in the Polar Bear made three voyages to the Siberian coast, and also after a rough voyage reached Point Barrow, the northernmost extremity of Alaska. Here a large quantity of whale-bone furs and walrus tusks were obtained and shipped south from Nome.

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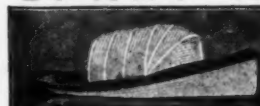
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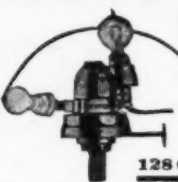
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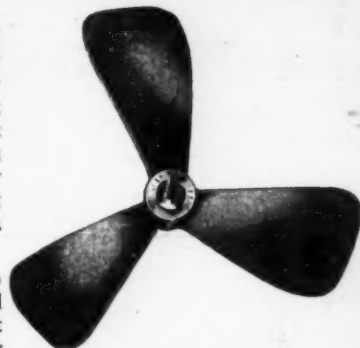
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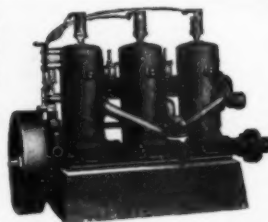
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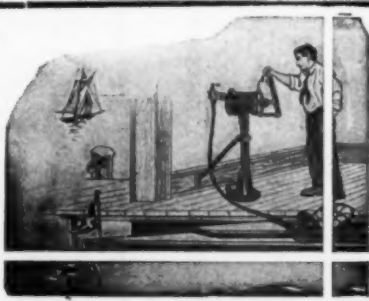
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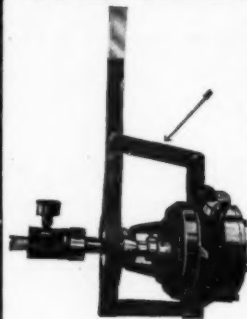
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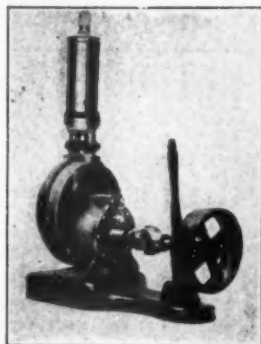
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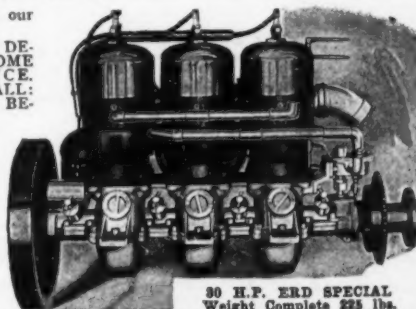
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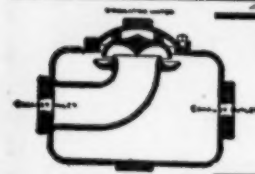


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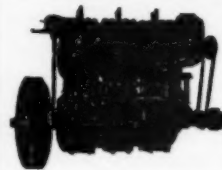
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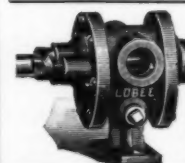
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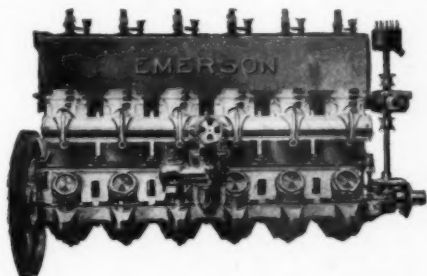
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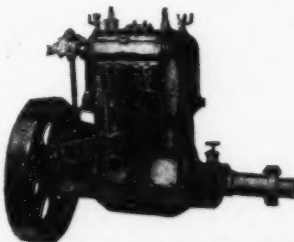
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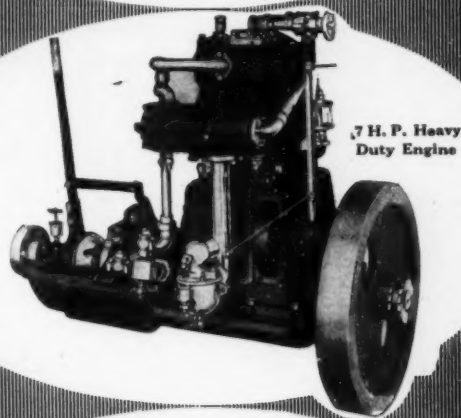
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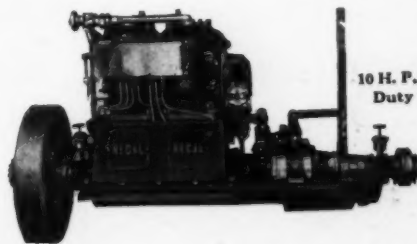
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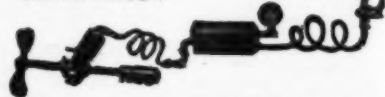
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Full Particulars, Prices, Etc., upon request.

C. N. CADY COMPANY

383 W. Center Street

Canastota, N. Y., U. S. A.

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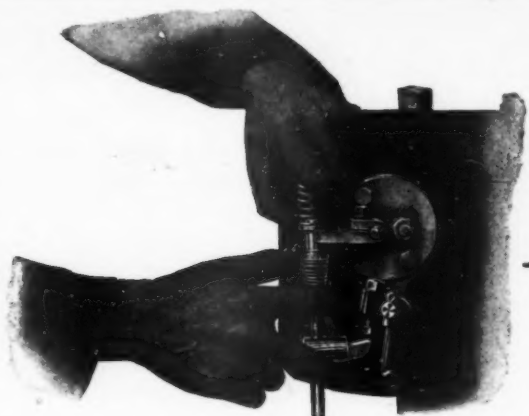
For Motorboat Floors,
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Easily laid, will not rust,
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ALUMINUM MATTING

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METALLIC AUTOMOBILE MATTING CO.

277 MILL STREET, ROCHESTER, N. Y.



The "Automatic" Igniter will work under ANY climatic condition or location or slant of the engine. There is only ONE removable part to it—a simple little plug. This is a distinct triumph in construction of which we are justly proud. This plug fits a hole, communicating with upper part of the Cylinder, where rise the most powerful gases. This insures INSTANT ignition and therefore starts the engine instantly, a feature remarked upon by all its users. The plug is seated all around, making a gasket unnecessary. The igniter rod can be snapped on or off the igniter without removing a bolt or changing any adjustment.

No Power is Dissipated in Turning Useless Wheels and Shafts



LL the power generated from the gasoline in your boat is used to *propel the boat*—and to propel the boat only—when you use The "Automatic" Marine Engine. That's why these engines cut down gasoline expenses *twenty-five and fifty per cent.*

It proceeds from the fact that the cylinders of the engine are independent, its construction is of an ideal simplicity and it is impossible there-

fore for any power to be wasted.

Because of that right consumption of power, there is *less vibration* with

"The Automatic"

Marine Engine than with any other.

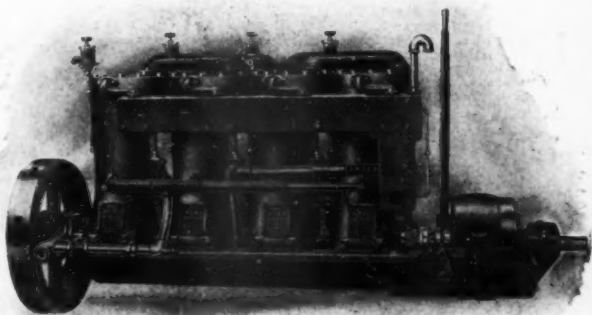
In other words—you can be at comfort in your boat.

Vibration of a boat indicates loss of power, loss of money—as well as being uncomfortable.

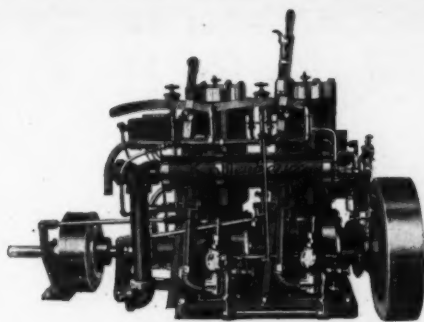
You save money with the "Automatic" also because they only need repairs once in a blue moon, and when that happens you don't have to pay somebody else money for repairs. You can do the repairing yourself, within ten minutes, with a tool equipment of five wrenches which comes with each engine. That's how simple this remarkable engine is.

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An exceptional marine motor with a unique reputation. The peer of them all—the Kahlenberg.

Continuous EFFICIENCY Guaranteed

You can instantly reverse it from full speed ahead to full speed astern without gear like a steam engine. Has one lever throttle control which reduces fuel consumption 50% with only a 10% reduction in the speed of the boat. The "Kahlenberg" is easily operated and simply constructed. It starts automatically without cranking. Can be slowed down gradually like a steam engine. It burns cheap fuel. All parts are easily accessible and removable. Made in sizes 2 to 7 H.P. Shipments made promptly. Send for catalog and "What Owners Say."

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One Lever Control

Always Ready

Kahlenberg

Reversing

Self Starting

A REVERSE GEAR IS THE CONNECTING LINK BETWEEN MOTOR AND MOTION

THE Motor Boat man using JOE'S IMPROVED MARINE REVERSING GEAR is always sure that a pull at the handle will cause his propeller to start, stop, or reverse, as desired.

He can be certain of this result because Joe's gear is sure and prompt acting, being built on correct principles.

It has but few parts, compactly and scientifically designed and constructed, and does not drag; but transmits to the propeller the full power and speed of the motor.

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Motion is transmitted to the gears through a powerful eccentric which brings a uniform strain on all the gears.

The slow equalized gear motion insures long life and kills all noise and grumbling.

Joe's gears are strong, efficient, reliable and durable.

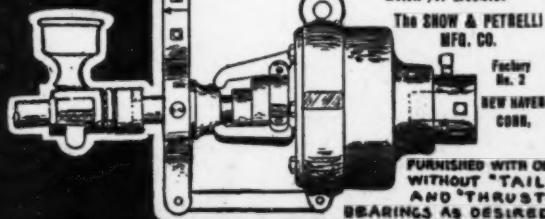
Investigate and compare them with others and you will take no other make.

How Joe's gears came to be what they are and why is worth knowing.

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THE SNOW & PETRELLI MFG. CO.

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NEW HAVEN
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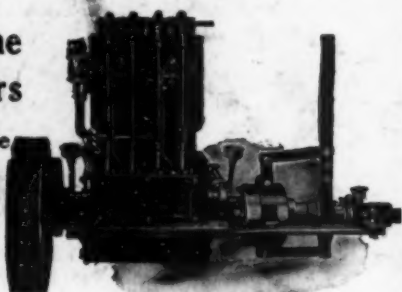


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Marine Motors

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1-2-4-6
Cylinders
8 Models
3 to 80
H. P.



Two Cylinder Frisbie Motor

If you are looking for a marine motor of the highest grade you cannot do better than select a Frisbie Motor. This is one of the few motors in which every gas engine expert must agree that every advantage of design is gained.

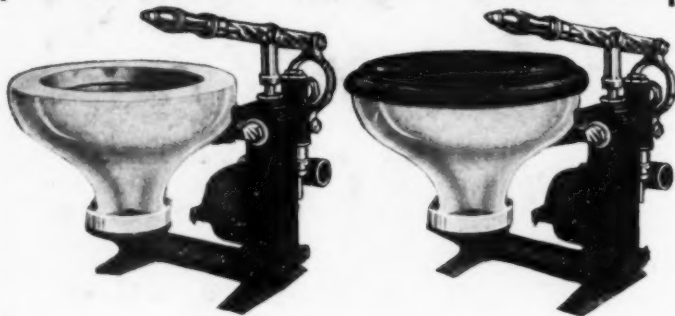
As an example—all valves are in the cylinder heads, directly over the pistons. This construction gives the greatest simplicity, accessibility and greatest power for fuel consumed of any design known.

In every detail of design, materials and workmanship, and in economy, power and reliability, Frisbie Motors are absolutely unexcelled.

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Patent outboard connections, hose and clamps or lead pipe and nipples	4.00
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Total	\$31.00

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This complete outfit, ready to install, which you can do yourself

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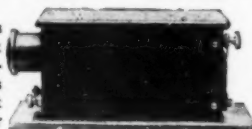
There is a Miller Engine built especially for each type of boat requiring from 8 to 40 H.P., whether it is a working boat or a speedy pleasure craft. All Miller Marine Engines are four cycle, two or four cylinder, with integral reverse gear or short base, as desired.

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THE K-W Spark Coil gives the hottest possible spark on the smallest possible battery consumption. It has large platino iridium contact points that do not freeze or stick together, and its winding is



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We also make K-W High Tension Magnetos and K-W Low Tension Magnetos that are guaranteed to start any engine without batteries and run it perfectly at all speeds, as well as K-W Lighting Outfits, and the K-W Master Vibrator for Ford Cars.

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EDISON BSCO PRIMARY BATTERY

For Motor Boat Ignition

Your engine may not run because of troubles of its own—but more probably, because of ignition troubles.

Your ignition troubles may be in your coil, spark plugs, wiring or battery,—but most likely in the battery.

Your first important step is to choose the right *kind* of battery. The answer is, primary.

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The Edison BSCO is the dependable battery for motor boat ignition—delivering the spark with unfailing regularity up to complete exhaustion of the last atom of active material. Renewals cost less than in other batteries, and the act of making renewals—simply unscrew the thumb-screw on the cover, let the old elements fall and supply new elements—is simpler than in any other battery.

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The same general class of boats will be built as was formerly built by the same management when connected with THE WEST MYSTIC BOAT COMPANY.

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The "NOANK" Cabin Cruiser or launch of **NOANK BOAT Co.** Noank, Conn., will now be synonymous for a boat designed for Safety, Efficiency and Comfort as was the "WEST MYSTIC" boat.

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POLICY: The **NOANK BOAT Co.** Noank, Conn., boats will be sold *Direct from the Factory*. The prices will be as low as consistent with a reliable product.

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An able launch designed for fishing and use on rough water. Has always made a satisfied customer.



Length, 20'.
Beam, 6' 4".
Draft, 2' 4".
Motor, 5 H. P.
Capacity, 14.
Speed, 9 miles.

Price \$375

Price includes Lights, Whistle, Life Preservers, Fire Extinguisher, Pilot Rules, L. P. Cushions, Flag Poles and Tie Lines.

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TRIMOUNT ROTARY WHISTLE BLOWER

Equip your boat with an adequate power signal—one that will send a loud, clear penetrating but pleasant sound one or two miles—that gets you the right of way instantly and which is strong enough to call help without fail, should you need it.

The Trimount is a brass nickel-plated whistle with a powerful little bronze rotary blower which contacts with the flywheel. Outfit made in three sizes for the smallest motor boats up to the largest pleasure craft afloat.

Whistle and blower can be connected by flexible rubber hose up to 25 feet long. Whistle can be placed anywhere in the boat and is instantly adjusted for a shrill or deep tone.

The blower and whistle are made entirely of metal so they last a lifetime without attention. Very small and compact and therefore require very little space.

This is a high-grade and efficient signal; used by the U. S. Life Saving Service. Its simplicity accounts for its low cost.

Order through your dealer or remit direct. Money refunded within 30 days if not entirely satisfactory.

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No. 1, 10 Gal. at
85 R.P.M.....\$20.00

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Trimount Rotary Hand Bilge Pump

This little pump is a necessity for safety and comfort in every boat. It lifts 10 gallons at 85 revolutions a minute. Will lift 18 gallons a minute at 150 R.P.M.

A child can keep your boat dry, no matter how fast you are shipping water. This pump is handy for many uses about the boat. Develops 30 lbs. pressure, with nozzle, for washing down decks.

Has suction lift of 25 feet. Fills a boat's bathtub in a few minutes.

Requires little space and can be fastened to bulkhead or anywhere else.

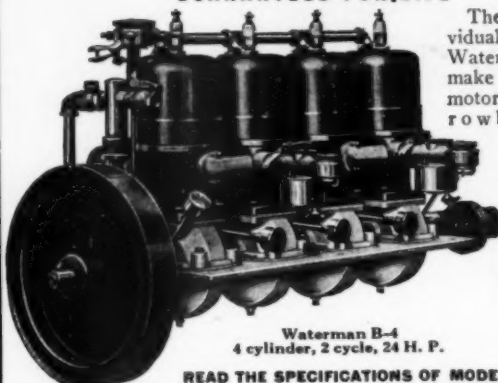
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Waterman B-4
4 cylinder, 2 cycle, 24 H. P.

READ THE SPECIFICATIONS OF MODEL "B"

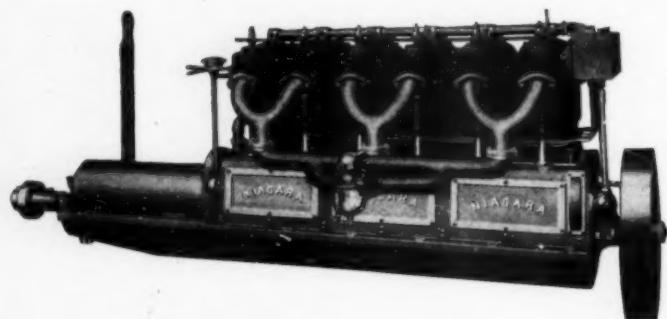
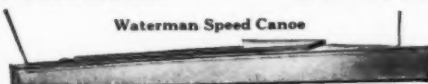
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4 cycle, in 2, 4 and 6 cylinders: 5 to 90 horsepower

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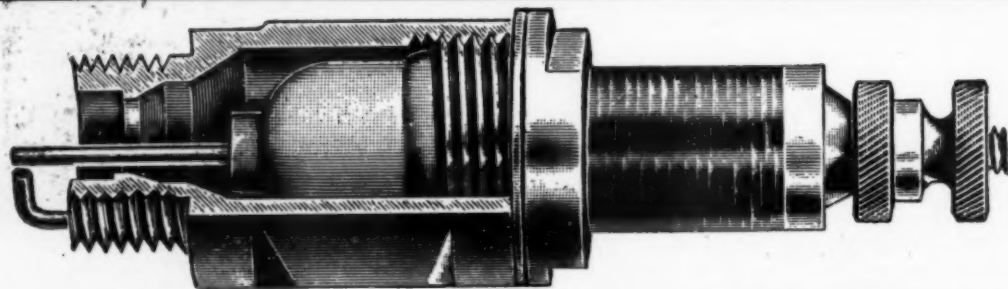
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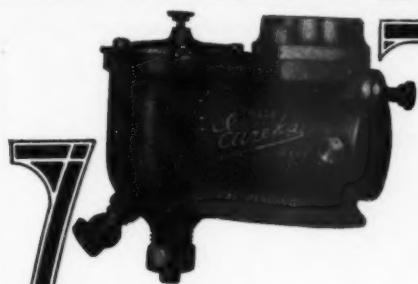


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MANUFACTURED BY

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The Eureka ^{Two Cycle} Carburetor ^{Special}

Eliminates any device for auxiliary air supply and all the troubles connected with floating ball or automatic spring valves.

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REVERSING

\$40 POWERFUL ENGINE For HIGH SPEED BOATS

This special 2 H. P. reversible motor, including shafting, propeller, stuffing box, etc., complete outfit, ready to install at \$40, is a remarkable value.

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High speed, absolute reliability. Extra power and extra wear. The Perfect two-cycle engine. 2, 3, 4, 6, and 10 H. P. From \$40 up. Two year guarantee. So simple in construction and operation a woman or child can run it.

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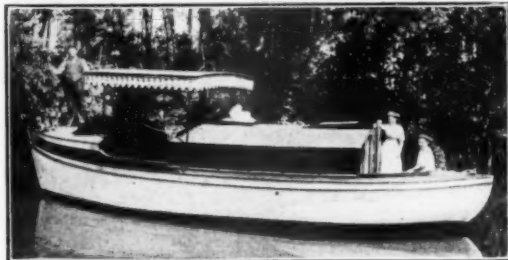
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Wealthy people buy these frames and have them completed in their home towns. They can then watch every piece of timber that enters the construction, plan every detail of cabin arrangement, and after hiring all the work done save at least three-fourths on the cost. Our building instructions are complete and anyone, experience in boat building unnecessary, can do the work.

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WE HAVE EVERYTHING FOR MOTOR BOATS, the fastest Propeller Wheels in the world. Besides Speed Propeller Wheels, we have the Towing, Weedless and Reversible, and a complete line of Marine Hardware, including the latest ideas in Steering Wheels, Underwater Exhausts, which need no expansion chamber; Bilge Pumps, Gasoline Separators, Propeller Jacks, Rear Starters, Anchors, Water Pumps, Air Pumps, Accumulators, Universal Joints.

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Surplus to Policy Holders over \$7,000,000

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24 ft. Auto Craft Special \$450.00

We guarantee this to be the fastest, safest and most thoroughly high-grade 24-ft. boat ever offered built. Equipped with the dependable Ferro engine, 2 H. P. and reverse gear. Speed, 10 miles. Seats 12 people. Hollow and round interlocking hull construction.

Air tanks under fore and aft decks makes the Auto Craft safe as a lifeboat—Capt. Larsen proved this in Niagara Rapids. Gasoline tank has overboard drain, eliminating the possibility of fire. Every point throughout is made right.

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The
Auto Craft
can't
sink

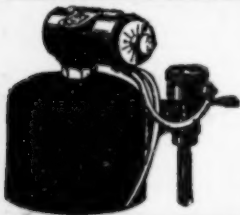
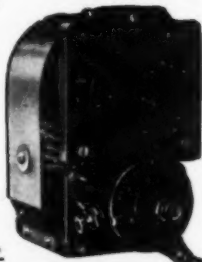
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SOLOCOIL

TRADE MARK

spark plug, doing away entirely with all high tension wiring and also acting as a spark plug hood.

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Quality Ignition

THE latest and best in water-proof jump spark coils. The case is guaranteed heat, weather and water-proof and contains the coil, condenser and vibrator. It fits over the spark plug and locks as shown in the illustration, automatically making connection with the tip of the



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"THE MOTOR WITH THE BORE AND STROKE"

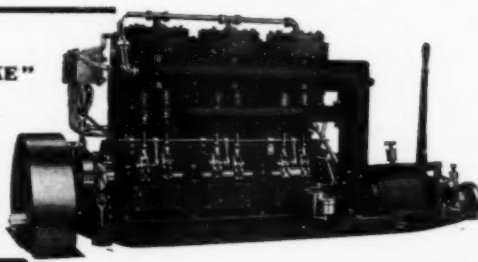
4 cycle - 5 to 100 H. P.

HIGH GRADE MARINE ENGINES for
DISCRIMINATING BUYERS

FUELS—Kerosene, Gasoline and Producer Gas

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Your flag will always wave in the breeze if you use the

Neverfurl Flag Staff

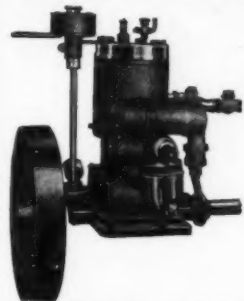
With the Neverfurl Staff it is simply impossible for the flag to wrap itself around the staff. After the sail you unstep the staff, flag and all, instead of having to unfasten the flag. Staff is held into deck by bayonet lock and can be instantly removed. Will not rust. Made for both bow and stern. Price \$4.50. Ready for use. Order from us or write for literature.

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5 H. P. Single Cylinder
Weight, 100 lbs.

Price, with Full Equipment

\$75.00

That is the proposition we put up to you when we offer

WONDER ENGINES

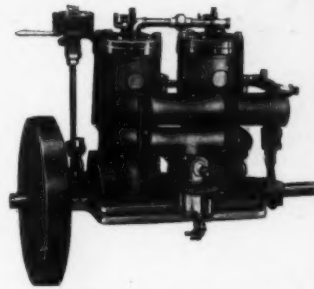
for your consideration. They are of the two-cycle, three-port type, and are claimed by experienced boat owners to be the easiest starting engine on the market and the least troublesome. Ask us to send you some reference letters we have received (unsolicited) for your perusal. We show our complete confidence in our product by covering every engine we sell with a FIVE-YEAR guarantee. Others guaranteed one year. Further, our terms are the most liberal ever offered by a marine engine maker. We will write you fully about this and any other points you bring up if you will let us know you are interested.

We build all sizes suitable for Speed, Pleasure and Work Boats.

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10 H. P., 2 Cylinders
Weight, 200 lbs.

Price with Full Equipment

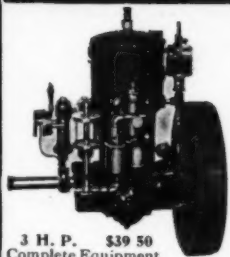
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High Speed

Du BRIE MOTORS

MADE IN 1-2-3 CYLINDERS, FROM 2 TO 30 H.P.

Heavy Duty

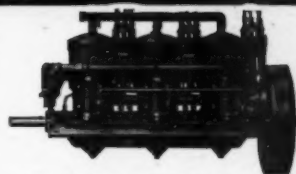


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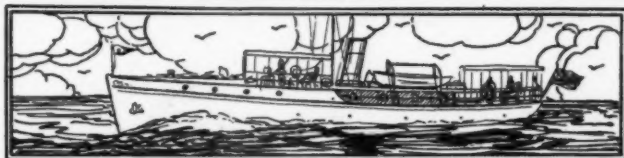
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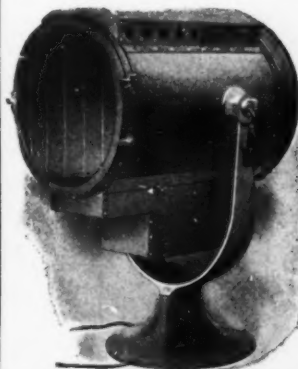
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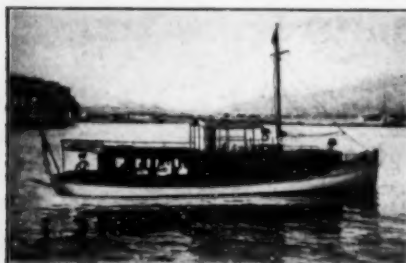
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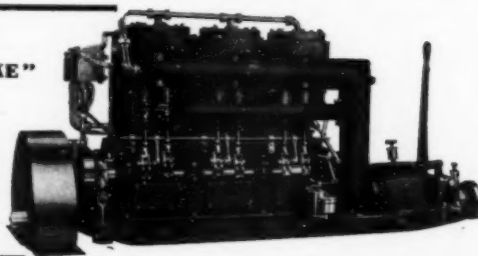
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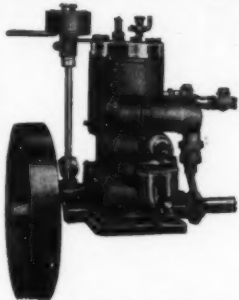
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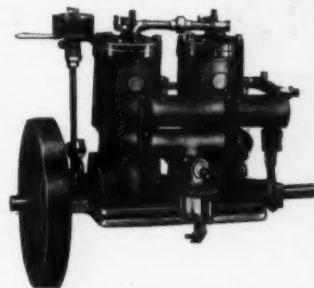
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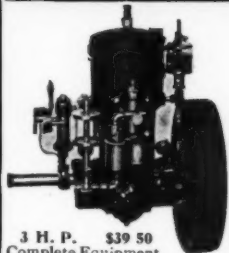
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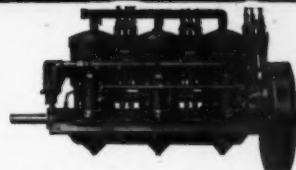


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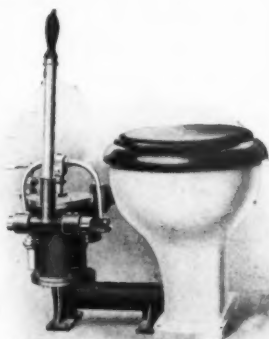


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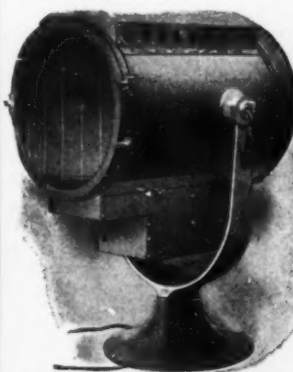
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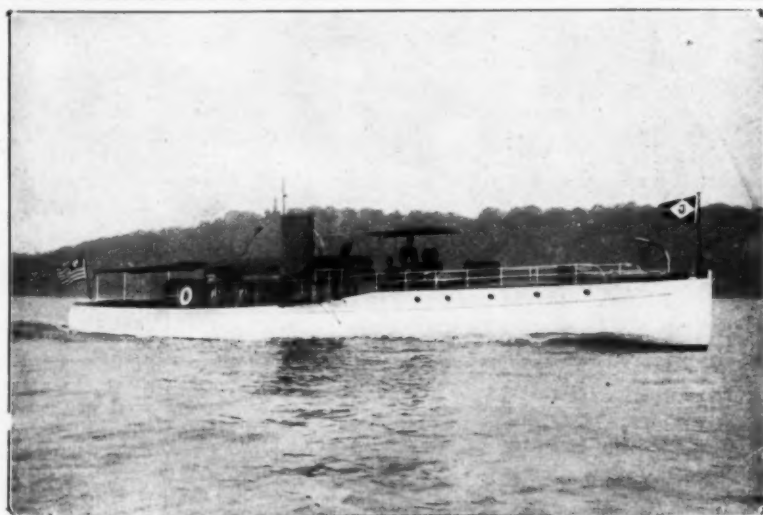
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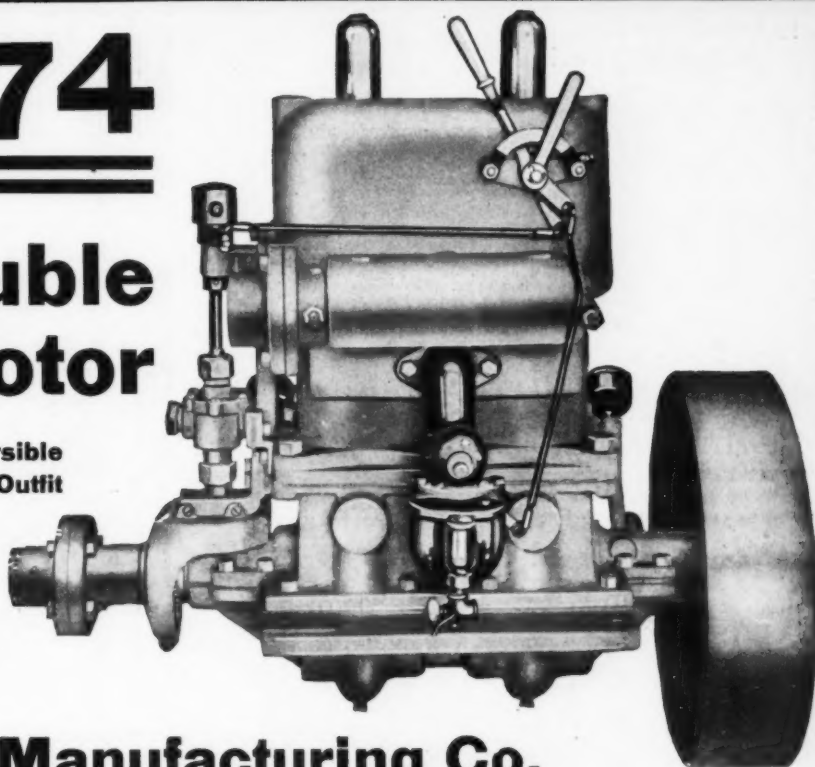
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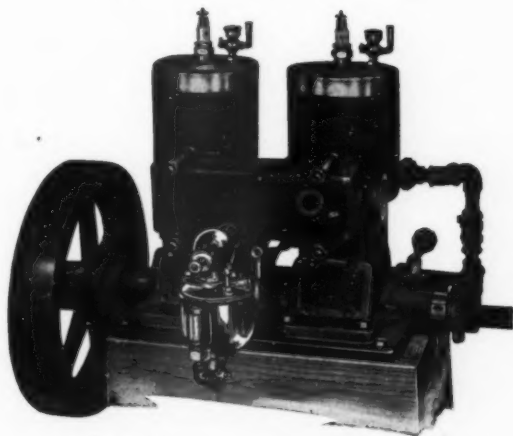
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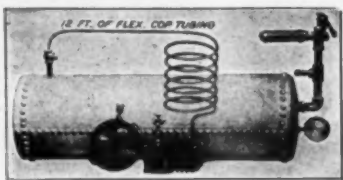
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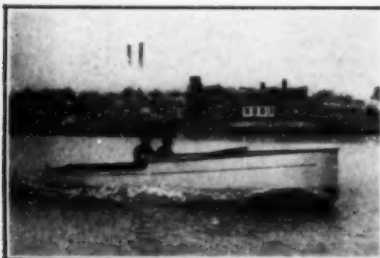
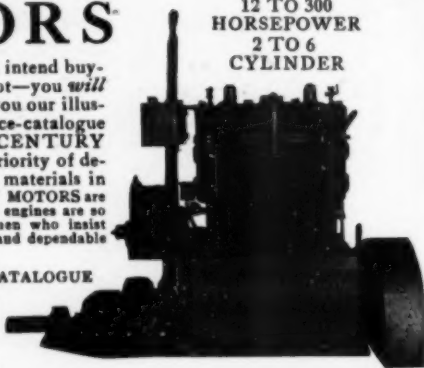
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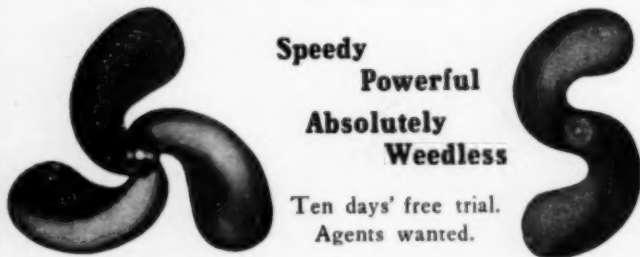
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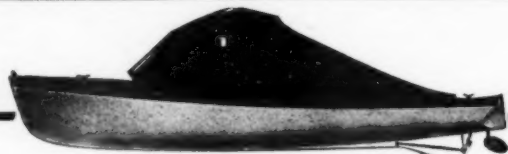
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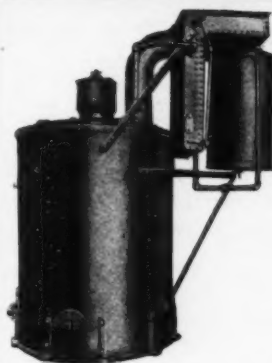
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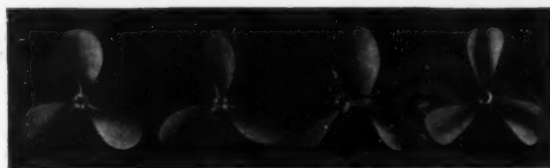
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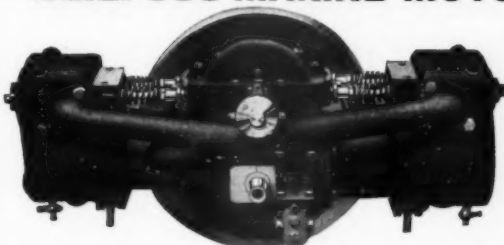
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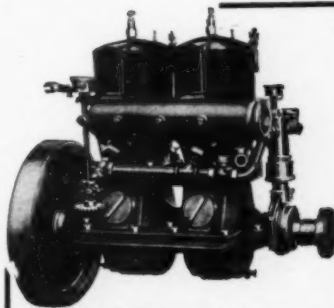
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T&M MARINE ENGINES

have broken all records for consistent service. Motor boat enthusiasts the world over are sending in repeat orders for the T. & M. because it's

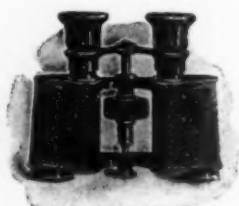
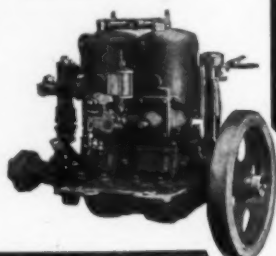
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Because it's correctly designed and constructed. There's a size and type for every craft up to 65 ft.—light, medium and heavy duty—1-2-3 and 4-cylinder. 2 H. P. and up.

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Agencies in all principal cities



THE VISIOSCOPE STEREO-BINOCULAR Power 7 Times

This glass is especially adapted for marine use. It has a very large, clear field, brilliant illumination, and depth of focus. The Price is \$33.75.

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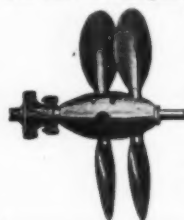
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Boston, Mass. '134 Bromfield Street

THE ROPER WHEEL MAKES MANOEUVERING A PLEASURE

Reduced in Price 25%

The immense demand for the Roper Propeller has caused us to so increase our manufacturing facilities and output that we have reduced the price 25%. We guarantee that the Roper Propeller will not be cheapened; in fact those now being made are superior to those previously sold. No motor boat owner can afford not to use a Roper Propeller because it gives instant control, either direction, by one controlling lever, without any adjustment of engine, insuring safety, economy and unmost pleasure.



Illustrated booklet gives full particulars.

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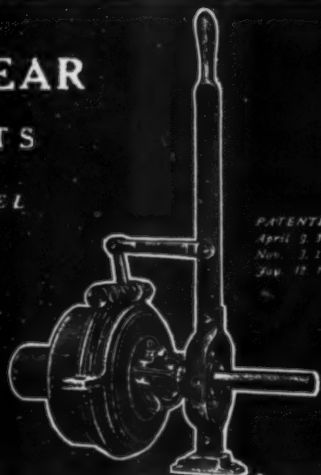
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Made Only of
HARDENED STEEL
SPUR GEARS

MOST RELIABLE
HIGHEST GRADE
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FOUR-SIZES CARRIED IN STOCK

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NEW YORK GEAR WORKS
GREENPOINT AVENUE
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Nov. 3 1902
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Oakland

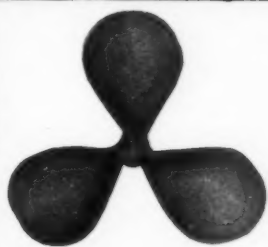
IT IS
SUFFICIENT

recommendation of the Oakland 20-32 H.P. and the Brushmarine 3-5 H.P. to say that they were designed by Alanson P. Brush, the famous designer of automobile motors, who has to his credit some of the most successful engines such as the famous little Brush Runabout, the single cylinder Cadillac, the Oakland and others.

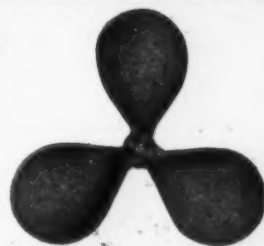
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HYDE TURBINE TYPE PROPELLERS



The name HYDE on a propeller is a
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EFFICIENCY



Many of the most important motor
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HYDE TURBINE TYPE PROPELLERS

They are properly designed for speed.

They run without vibration.

They are made of **Manganese Bronze**.

They are finished in the best possible manner.

THE PROPELLER OF QUALITY.

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when you can save money by buying from us? 1911 catalogue with CUT RATE PRICES MAILED FREE. We carry everything for the Motor Boat. Agents for Bryant & Berry Speed Propellers, TOLEDO MOTORS and Roper Reversible Propellers.

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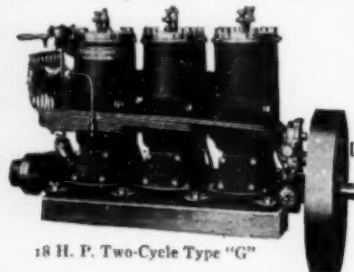
It's The Engine That Makes The Boat

If you want an absolutely reliable power boat—one that will stand hard service 365 days in the year, you want the BEST engine you can get.



Fairbanks-Morse Marine Engines Are Absolutely Guaranteed

They always run satisfactorily and develop more than rated horsepower. Back of our guarantee you have the largest manufacturers of internal combustion engines in the world. When you buy a Fairbanks-Morse you KNOW that you are getting the best possible design, material and workmanship. Always easy to start. No cranking necessary on two-cycle engines. All parts



18 H. P. Two-Cycle Type "G"

interchangeable and easily accessible.

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Best Speed Wheel in the World

Has Reputation—Material—Speed—Design

COMPLETE UP-TO-DATE LINE OF

BOAT FITTINGS

Made by skilled workmen, from the very best material that money can buy, and we sell them all to you cheaper than you can buy trashy goods



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"Never Fails to Grip"

Bull-Dog Reverse Gear



"Never Fails to Grip"

The only positively guaranteed gear on the market. You run no chances. Not one complaint during season 1911.

Handsome Design—Responds Immediately—Works Like Clock-Work

What is more aggravating or even dangerous than a "balky" reverse gear? Users of the Bull-Dog *know* when they pull the lever the results are immediate. Works smoothly with no grating or grumbling, as the strain on the gears is uniform, insuring strength and durability.

Advantages Over Other Gears

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GUARANTEED OR NO SALE



If you give the "Bull-Dog" a trial you will use no other

Made in 4 sizes — Send for Catalog

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A NEW ANCHOR

The NAVY

GALVANIZED

Note V shaped lug on end of shank (patent pending). Shank must slide to correct holding position at slightest pull on cable. Strain coming above center of head throws flukes downward. Solid shank—no weakening hole. No pockets in head to bring mud to deck.

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Fits Any Engine

Absolutely prevents any possibility of injury from back kicks. Geared to suit the strength of any operator and the horsepower of any engine. Makes starting the engine easy, quick, safe and sure.

Write today for information

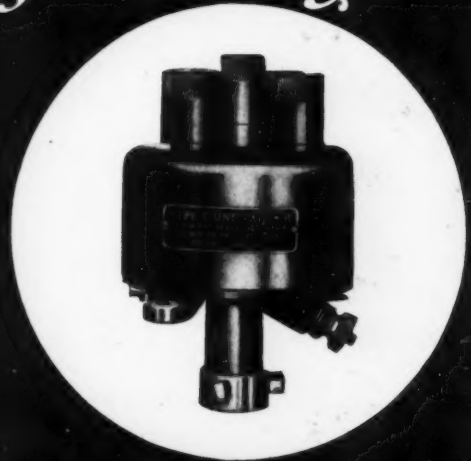
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The Atwater Kent Ignition System



For Marine Engines

No vibrating Contacts.

No troublesome Commutator.

Better than the magneto at half the price.

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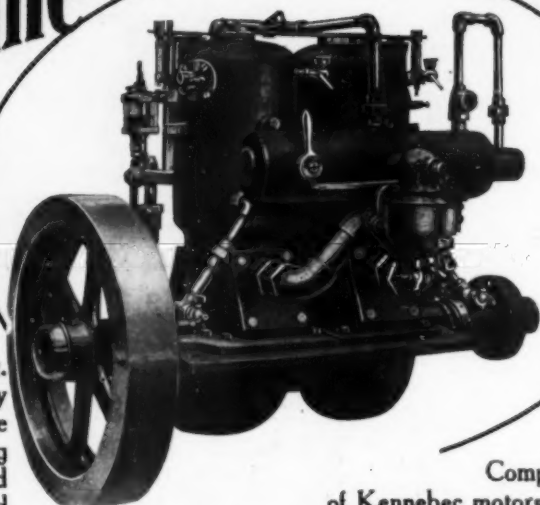
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Gasoline

KENNEBEC

Gasoline Engines are not "rough jewels"—they are "polished jewels" in every respect. They are sturdy enough for the severest working boat usage, and handsome and speedy enough for the finest pleasure boat.



Engines

Besides, in the Kennebec you get full-rated horsepower, plus a little bit more. Every Kennebec exceeds its rated horsepower by 30 to 40 per cent.

Compare the bores and strokes of Kennebec motors with those of any other marine engine of the same horsepower.

Kennebec, 1 cylinder: 2 H.P., 3½" bore and 4" stroke; 3 H.P., 4½" bore and 4½" stroke; 5 H.P., 5" bore and 6" stroke.

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Be sure to get horsepower for your money

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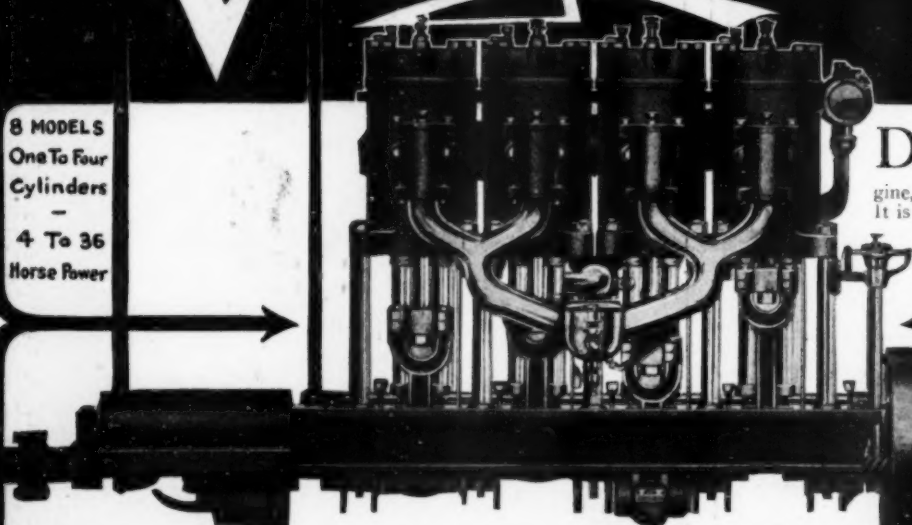
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ASK ANYONE WHO OWNS A KENNEBEC

Vanguard

2 Cycle All Open Base

8 MODELS
One To Four
Cylinders
—
4 To 36
Horse Power



Do you see that Open Base? That is the most revolutionary improvement ever made in the construction of any internal combustion engine, either of the two-cycle or four-cycle type. It is not the mere fact of an open base, but the wonderful results obtained by this means, as applied exclusively in Vanguard two-cycle engines, which makes this refinement so remarkable.

THE unusual construction gives Vanguard engines at least a dozen points of superiority, such as no leakages, perfect carburetion and combustion, an odorless exhaust, a saving of 50 per cent. in fuel, over other two-cycle engines and 25 per cent. excess efficiency over all other engines. It is easy to start and control, extremely accessible, no side thrust or oblong wearing in the cylinders and is capable of exhausting 3 feet under water.

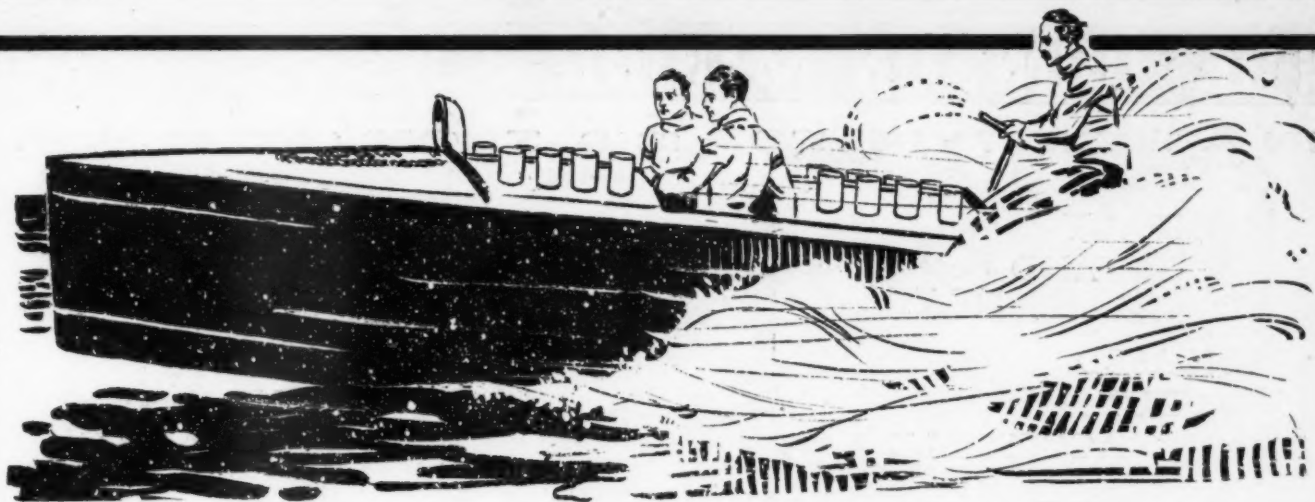
There is not another engine like the Vanguard on the market. Owing to its exclusive principles of design it is the most Reliable, Powerful, Economical, Accessible and Efficient engine made.

You will not be acquainted with the height of perfection in engine design and construction until you have studied the Vanguard catalog, which explains the exclusive features of the Vanguard. Don't deny yourself this knowledge.

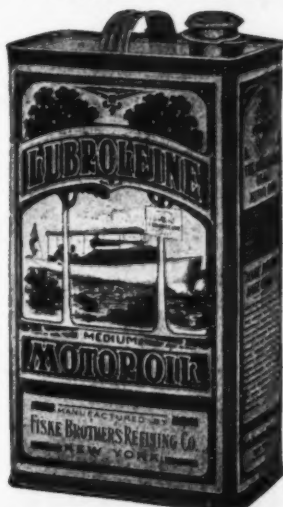
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VANGUARD ENGINE COMPANY

18 Tremont St., Boston, Mass.



The Solution of Your Lubricating Problem!



LUBROLEINE MOTOR OILS

"Make Motors Make Good"

ALWAYS THE SAME

ALWAYS THE BEST

Lubroleine Motor Oils are made in several consistencies to meet the different mechanical requirements. Lubroleine *Special Light Motor Oil* is a low cold test oil, free from carbon, and possesses exceptional lubricating qualities. It is the ideal oil for winter use, as it retains its fluidity at 20 degrees below freezing.

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Lubroleine Motor Oils and Greases are sold by good dealers throughout the United States. If your dealer does not stock them, send us his name, using the coupon below, and let us know your requirements. We will see that you are promptly supplied. These oils, likewise Climax Synovia Cup Grease, etc., are fully described in our booklet "The Mission of Lubroleine," which we will be pleased to send upon request.

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and advise where I can buy Lubroleine Motor Oils and Greases.
My dealer.....
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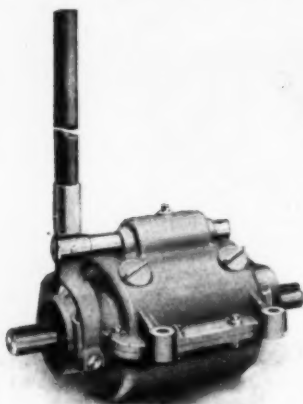
THE JOHNSON MARINE REVERSE GEAR

IN A NEW TYPE FOR 1912, FROM 1 TO 10 H. P.

COMPACT
AND
NEAT

ENCASED
BUT
ACCESSIBLE

TELLS THE
STORY

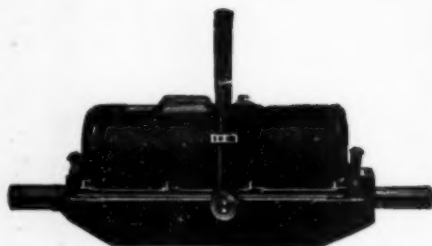


SILENT
AND
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JOHNSON
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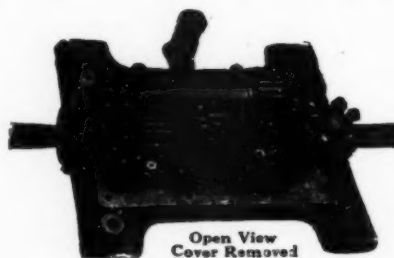
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One Year

OUR HEAVY DUTY TYPE



Should be investigated by all Gas and Gasoline Engine builders and buyers. For any Power Up to 30 H. P. In Stock for Immediate Shipment.

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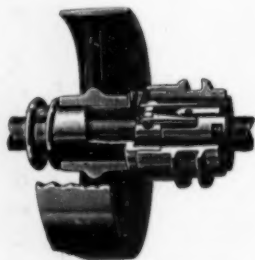


Open View
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THE JOHNSON FRICTION CLUTCH

FOR MACHINE SHOP OR FACTORY EQUIPMENT, ON THE OVERHEAD LINE OR COUNTERSHAFTING

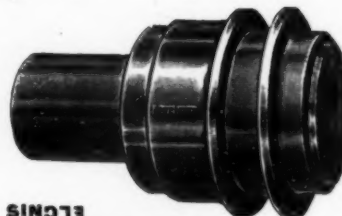
In Five Sizes, Single or Double, to fit any shaft up to a 3" Dia.



FRICTION CLUTCH
with Pulley Mounted on
Hub.

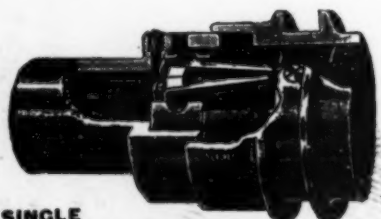


DOUBLE CLUTCH--EXTERIOR
No bolts, nuts, links, etc., to become loose
and cause trouble.



SINGLE
CLUTCH--EXTERIOR
It is round and smooth, with no
protruding parts, making accidents
impossible.

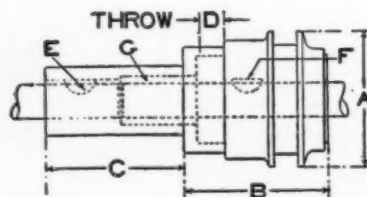
IN A CUT-OFF COUPLING TYPE, FOR USE IN MOTOR BOATS WITH MARINE ENGINES.



SINGLE
CLUTCH--INTERIOR
Can be instantly adjusted to any ten-
sion with one screw.

A small, neat, compact Clutch, capable of handling considerable power at high speed, for use where a reverse is not required.

We are Clutch and Re-
verse Gear Specialists



Showing the shaft aligning arrange-
ment in the Cut-off Type.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

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It's Better to be SAFE THAN SORRY

"I have run your 20 horsepower engine four seasons; it has never given any trouble and has not had a machinist do anything to it. My boat is 35 feet O.A.L., 7 foot 7 inch beam and will make eighteen miles in one hour, making it the fastest boat on the lake excepting the speed boats. I expect to build a 60 foot boat, also a 30 foot speed boat, and shall install a DOMAN in both boats. Why? My experience in the last four years shows me there is none better.

W. E. Hodgdon,
Haverhill, Mass."

That's just one, out of the many fistfuls of crackerjack letters that appear often in our mail. They make mighty lively reading. We've published them in a book. Every letter has an original back of it.

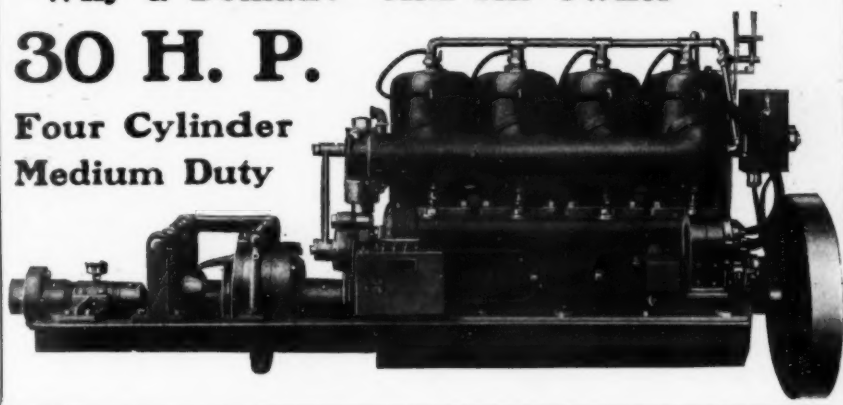
Shall we send you this book? When you've read a few pages into it you'll see why the Doman satisfies so thoroughly.

We must repeat what we have emphasized so often: "Don't buy any motor for your new or old boat till you have investigated thoroughly." Your decision will make or mar your whole season's pleasure.

"Why a Doman?—Ask An Owner"

30 H. P.

Four Cylinder
Medium Duty



The Marine Motor That's Trustworthy—Reliable

Remember the Doman is not in the **Cheap-John class**. It's a reasonably priced engine, ranks with the best and gives A-1 service. It is reliable, won't balk in any seaway. It runs smoothly and needs next to no attention except proper lubrication. It is simply constructed; has a minimum of parts, all quickly and easily accessible. Any intelligent man or woman can learn to run it in a few hours by reading our clearly stated, printed instructions.

Constructed from high-grade materials—made by skilled workmen—superintended by experienced marine engine builders—and thoroughly tested before leaving factory—these with a score of other features give the Doman its remarkable reputation for trustworthiness, long life and smooth running qualities.

Domans are made in sizes from 5 H. P. to 75 H. P.

We deliver each engine with equipment complete: Magneto, Force-feed Oiler, Propeller, Shaft, etc., etc.

Write for the "Owner's Book," catalog and recent literature.

The H. C. Doman Co.

Dept. C, Oshkosh, Wis.

New York City

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TRADE MARK REGISTERED

SPARK PLUG

The 1912 RED HEAD is today hailed the undisputed spark plug success of the season.

The motor is yet to be produced that the 1912 RED HEAD cannot master.

The reason is that RED HEADS are designed to ignite the mixture in the engine—not to fit the holes in the cylinders.

Used successfully and consistently by such well-known racing men as Ralph De Palma (Simplex), David Bruce-Brown (Fiat), Caleb Bragg (Fiat), Eddie Hearne (Benz), and others.

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RED-RIB

RED-RIB

THE GUARANTEED IGNITION WIRE

"The Quality is Apparent in Every Inch"

The very best compound is used for the insulation of RED RIB Cable. Prove this by bending it back and forth. *It will not crack.*

The efficiency of RED RIB has been proved by laboratory breakdown tests. The primary rubber cable successfully withstood 19,000 volts and the 7 mm. 30,000 volts in water for half an hour. It broke down at the edge of the pan and *not* in the water. This illustrates the high voltage capacity of RED RIB.

The cambric covered styles are varnished and made impervious to oil and grease.

Used by the manufacturers of the Highest Grade Engines and Motor Boats See our exhibit space 625 and 626 at Madison Square Garden, January 6th to 20th, 1912

Emil Grossman Company Manufacturer, 250 West 54th Street, New York

Branches carry stock

Chicago Branch House: 1436 Michigan Ave. Detroit Factory and Branch House: 844 Woodward Ave.

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No. 90. 9 m/m Rubber, 12c. ft.

No. 70-M. Magneto, White Rubber, 10c. foot.

No. 100-B. Primary Braided, 5c. foot.

2 way Primary Braided, 10c. ft.

No. 200-B. Secondary Braided, 12c. foot.

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Perfex

INSIST ON Perfex
With Your Boat Or Engine

NEW

Perfex

Single Spark System

One spark, and that a fat one, for each explosion. Furnished as an auxiliary device or combined with our regular Ignition System.

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Current Alternating Timer

Every current impulse in the reverse direction. It solves the trouble from pitting and sticking vibrators in any Jump Spark System.

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Induction Coil, Condenser and Vibrator all in one casing. An inexpensive outfit for one cylinder engines.

OLD TRIED

Perfex

Low Tension Rectified Magneto

Specially adapted to Perfex Ignition Mechanically and Electrically far in advance. Improved for 1912.

OLD TRIED

Perfex

Waterproof Speed-Adding Ignition

With its detachable spark plug Removable pole reversing Master Vibrator, furnishing the same spark in every cylinder. Its positive waterproof features suggest its use as sole or auxiliary ignition on every jump spark engine.

Perfex Ignition

Has done more to make Jump Spark Ignition practicable than any other one thing.

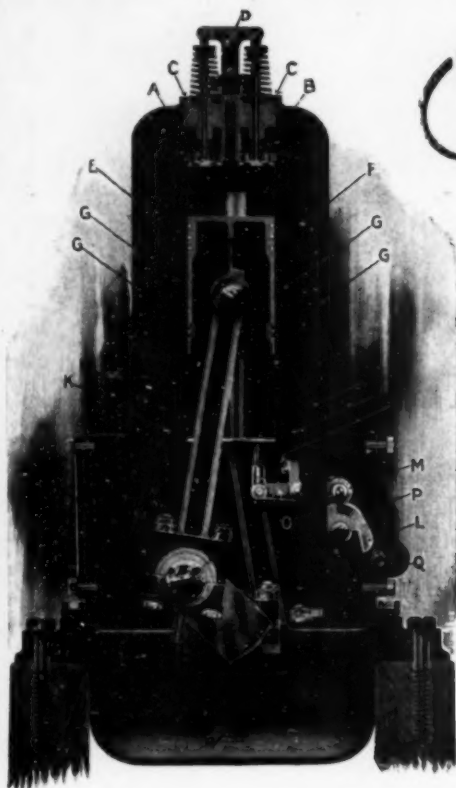
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P. O. Box "D"

Canton, Mass.

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RALACO
THE SILENT ENGINE

No outside piping.
No oil cups, sight-feed oilers or oil tubes.
Yet a perfect lubricating system.
Both valves in the head, insuring greatest efficiency.
Low fuel consumption.
Less parts than any four cycle engine, THEREFORE
Less chance, for trouble.
Less expense for upkeep.
More reliable.

The Block Island Race.
The New Rochelle Yacht Club Race.
New York to Albany and Return Race.
Great Lakes Power Boat League Cruiser Championship Race.
Colonial Yacht Club — Rockland Light Race.
Harlem Yacht Club — Stratford Shoal Race.
National Association Carnival — Class E Cruisers' Race.

All won by boats equipped with
Ralacos

Add to this, the remarkable performance of LIMIT in traveling from Ketchikan, Alaska, to Vancouver, B. C.—618 miles in 57 hours 58 minutes, or an average speed of 10.65 miles per hour, and we believe that you will be convinced that no engine would be better suited for YOUR cruising boat.

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SPLITDORF
MAGNETO

"Always There"

CHAMPIONSHIPS on land and water have been the lot of SPLITDORF EQUIPPED engines during the 1911 competitive season.

There has been no mistake. The SPLITDORF EQUIPPED Peter Pan IV won the championship of the Hudson River in the season's final race—a free-for-all for speed boats.

It matters not whether it is a speed boat or a "Kicker"—a racing or pleasure automobile, a motor-cycle, an aeroplane, a motor truck or an agricultural motor—SPLITDORF ignition is the ideal ignition and ALWAYS THERE WITH THE GOODS.

And don't fail to investigate SPLITDORF "GEM" TYPE MARINE COILS. They are built in covered oak boxes, PROTECTING ALL PARTS. They are of the highest grade with interchangeable units and are ECONOMICAL ON BATTERIES. Single cylinder at \$6—also made for two, three and four-cylinder.

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C. F. SPLITDORF
Walton Ave. and 138th St., New York

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BUILT BY WRIGHT
WEGO
ARROW

Build Your Own Boat

A money-saving recreation during your spare time. We offer you the latest designs and instructions originated by Mr. Chas. Desmond, the famous naval architect in the

New Type Auto Boats

complete and in the

Knock-Down by the Unit Idea

Something new and original in Boat Building.

If You Have the Time, It Will Be a Pleasure to Build Your Own Boat

Nothing is more interesting to the average professional or business man than a few hours each week spent in the workshop building a boat, studying the design, planning his work and watching the results of his efforts advancing into a pleasure craft in which he is to spend many hours of most exhilarating sport—Motor Boating.

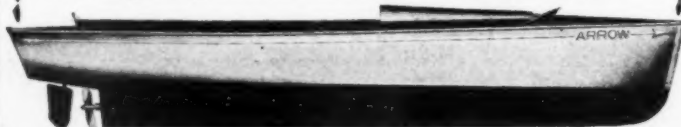
Can a man who is not a mechanic build a boat? We say most emphatically that he can. Any man who can handle a hammer, use a screwdriver and clamp, can build a boat by our perfect system of construction—and a good boat at that.

By building your boat the "Wright Way" you eliminate the builders' large profit, heavy selling expense and excessive freight charges. This means a saving to you of from 25% to 75%.

NO Need of Flimsy Paper Patterns to Bewilder and Mystify you. We supply you with Boats in the Knock-Down, all machined and cut to fit and ready for you to reassemble. We supply you with every piece of material necessary to complete your boat.

Buy your Boat and Build it Yourself under the "Wright Way, which is the Desmond Way," and your boat will be a success at a very big saving in cost. We furnish boats in any stage of construction, either complete or in the knock-down. Write for new descriptive bulletin explaining what you get mailed Free.

C. T. Wright Engine Co., 201 Adams St., Greenville, Mich., U.S.A.



When writing to advertisers please mention MOTOR BOATING, the National Magazine of Motor Boating.

ESTABLISHED 1840INCORPORATED 1909**GEO. B. CARPENTER & CO.**

Manufacturers and Jobbers of

Marine Supplies Motor Boat Equipment Racing Sails, Etc.

—WE MOVE—

to new and much larger quarters, January 1st, 1912, to keep step with the rapid growth of our Marine Supply business.

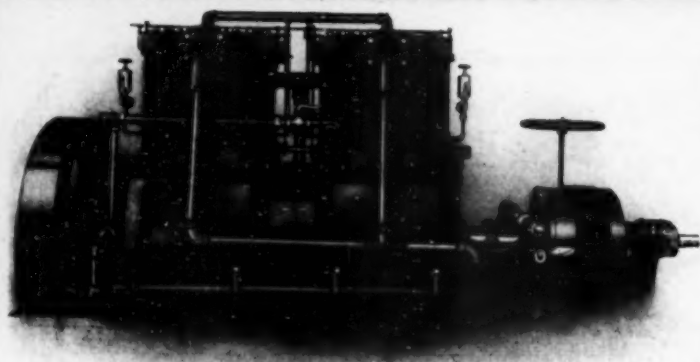
¶ Our new premises give us *twice the space* we have been occupying—*twice the ability* to handle your orders promptly and satisfactorily—and with our location in *Chicago, The Great Central Market*, give us an altogether unrivaled position in the trade.

GEO. B. CARPENTER & CO.

Present Address

5th AVE. BRIDGE, CHICAGO

NOTE:—Send 20c. in stamps to cover postage on our 500 page Marine Supply catalog No. 101, to be refunded on your first order. New 1912 discount sheet and price list ready about February 1st, 1912.



Type "H" Four Cylinder 50 H.P. Engine; Bore 8 1-8 ins.; Stroke 10 ins.; R.P.M. 320; 42 ins. Propeller

1891-1912

GLOBE

THE REAL HEAVY DUTY ENGINE

(16 H. P. to 110 H. P. Two to Four Cylinders)

The Engine for Commercial Boats

Thousands in Service in Nearly All Parts of the World

OUR 1912 CATALOGUE "K" NOW READY, YOU SHOULD HAVE A COPY

Also Builders of the

EDDYSTONE-GLOBE

OPEN CRANK-CASE TWO-CYCLE ENGINE

(6 H. P. TO 48 H. P. ONE TO SIX CYLINDERS)

OUR CATALOGUE "O" AND BULLETIN SENT ON REQUEST

PENNSYLVANIA IRON WORKS CO., EDDYSTONE, PA.

REBUILT ENGINES OF OUR OWN AND OTHER MAKES FOR SALE. 3 H. P. TO 90 H. P.

The following table shows the average amount of advertising carried each issue by the various marine publications during the first ten months of 1911:

	PAGES	LINES*
MOTOR BOAT	91-1/3 which equals	35,448
MoToR BOATING	66-2/5 " "	33,465
RUDDER	65-9/10 " "	16,613
POWER BOATING	60-3/5 " "	15,271
YACHTING	32-1/10 " "	13,482

Lines are the unit of measure adopted by all the National Magazines and Newspapers. There are 14 lines in an inch.

Gains and Losses

The figures below show the total gains and losses made by the above magazines during the first ten months of 1911 compared with the same period of 1910:

GAINED

	PAGES	LINES
MoToR BOATING	213 1/4 which equals	107,478
RUDDER	83 " "	20,916
POWER BOATING	13 1/4 " "	3,339

LOST

	PAGES	LINES
YACHTING	23 1/4 which equals	9,765
MOTOR BOAT	55 " "	21,340

MOTOR BOATING during the first ten months of 1911 gained 47.3% over the same period for 1910. This gain is five times the gain made by any other marine magazine, while on the other hand you will note by referring to the above figures that two of the magazines show a loss. This remarkable growth of MoToR BOATING, as shown by its tremendous gains, proves it to be of superior advertising value.

MoToR BoatinG, 381 Fourth Avenue, New York City

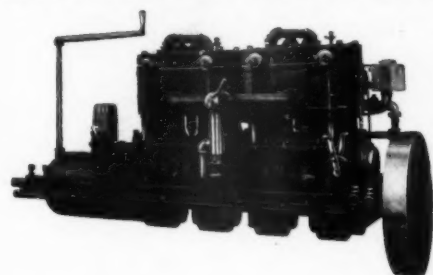
KNOX MOTORS

BUILT ESSENTIALLY FOR HARD WORK

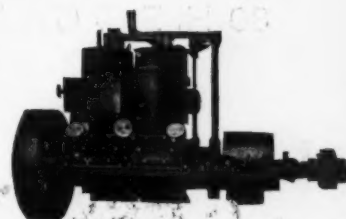
USE GASOLENE — KEROSENE — ALCOHOL — DISTILLATE

There are many good marine motors on the market—some better than others—but none of them excel Knox Motors. Because of their common sense design, liberal proportions and honest construction they are supreme in reliability, simplicity, power and economy.

For the little 3 H. P. Knox which drove the 25 foot auxiliary yawl "Seabird" across the Atlantic last summer, to our 40 H



P. heavy duty model, every Knox Motor is equally well designed and well built. They give uniformly good service, day after day, year in and year out.



Owing to the wonderful Knox Marine Carburetor, Knox Motors run equally well with either gasoline, kerosene, alcohol or distillate for fuel. This carburetor always delivers a perfectly mixed vapor of highest explosive power, without any large super-heating chamber or other intricate or cumbersome devices. The Knox carburetor

gives the same successful result on any style of marine motors.

Knox Motors are made in 17 models, one, two, three and four cylinders, from 3 to 40 H. P.; either make and break or jump spark, as desired. — The 20 H. P. 2 cylinder and 40 H. P. 4 cylinder heavy duty models are of the four cycle type, while our smaller motors up to 22 H. P. are two cycle.

KNOX YAWL LAUNCHES

FIVE SIZES

THREE GRADES

Knox Yawl Launches are 19', 22', 25', 28' and 30', seating from nine to twenty-four persons. They are equipped with Knox Motors of proper size and are altogether the most sea worthy little boats to be had. All except the smallest size can be built with either Trunk or Hunting Cabin. Like our motors, Knox Launches are built essentially for hard work. Our Grade A boats are equal in every detail of finish and equipment to the finest pleasure launches built. Grade B is equal to any average launch but is not so expensively finished as Grade A. Grade C has the same ability as the costlier grades, but is built especially for fishing, commercial use, etc., and for all who want maximum service at the minimum cost.

We are in a position to build any style, type or grade of boat desired, from 15 to 60 feet in length. Sketches, designs and specifications submitted upon application.



Before you buy a motor of any size, get the Knox Catalog. It tells many interesting facts, features and theories of marine engine designs in general and of Knox Motors in particular. Don't buy or build a boat of any kind up to 30 feet until you have full information and prices on Knox Yawl Dory Launches.

Literature free upon request. Write for it to-day.

Camden Anchor-Rockland Machine Co.

CAMDEN, MAINE, U. S. A.

TREBERT

RELIANCE
GASOLINE PATENTED ENGINES

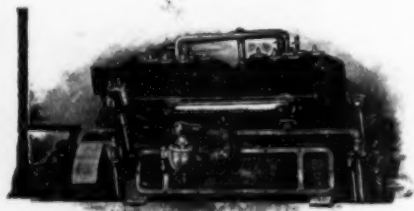
40 H. P. 4 CYLINDERS
60 H. P. 4 CYLINDERS
80 H. P. 4 CYLINDERS

60 H. P. 6 CYLINDERS
90 H. P. 6 CYLINDERS
80-100 H. P. 8 CYLINDERS

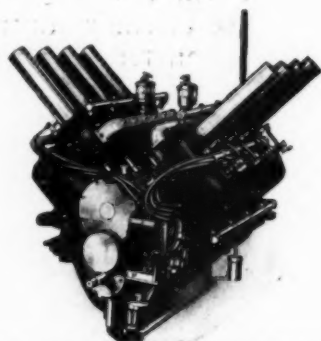
NOISELESS—POWERFUL
RELIABLE—SELF-OILING

ENGINES FOR ALL KINDS OF
PLEASURE-WORK & SPEED BOATS

CATALOG WILL BE SENT FREE
UPON RECEIPT OF
REQUEST



SPEED AND HEAVY DUTY MOTORS

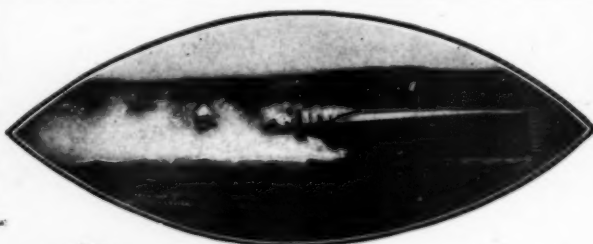


80-100 H. P., 8 Cyl., SPECIAL RACING ENGINE

H. L. F. TREBERT ENGINE WORKS

499 ST. PAUL ST., ROCHESTER, N. Y.

If you are not a
user of Pyrene, let
us protect you as
we did the Dixie IV



Included in the list of Fire
Appliances issued by the
National Board of Fire Under-
writers and the Motorboat
General Insurance Agency:
Approved by United States
Steamboat Inspection Service



The Waldorf-Astoria,

New York, 12th July 1911

The Pyrene Manufacturing Co.,
410 East 32nd St.,
N. Y. City.

Dear Sirs:

Kindly ship via express: Six (6) "PYRENE" Fire Extinguishers,
and mark the package as follows:

F. K. Burnham, Esq.,
For "Dixie 4th"
c/o Staten Island Ship Building Co.,
Mariner's Harbor, Staten Island, N.Y.

The new "DIXIE 4th" will be launched within a few days, and I
do not care to take any chances.

Kindly give this matter your immediate attention, and oblige

Very truly yours,

F. K. Burnham

Dixie IV Planes to Victory with "Pyrene" on Board

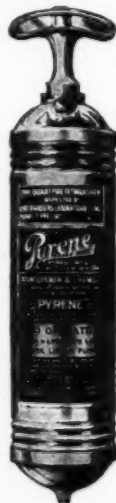
Even if every ounce of weight counted,
Even if every inch of space was treasured like a gold
mine,
Yet the Dixie IV added 30 pounds to her equipment by
installing six

Pyrene Fire
Extinguishers

The Dixie IV could afford to take no chances. For the slightest
blaze would have put her out of the race entirely.
While with Pyrene on board the most dangerous gasoline fire could
be instantly extinguished.

As a fire extinguisher Pyrene is absolutely supreme. It will put out
any kind of incipient fire and it will not freeze at 60 degrees below zero.
Being enclosed in an air-tight cylinder it will not evaporate—it does not
lose strength—and it will not injure anything with which it comes in
contact.

Have you the same protection from fire, or are you taking a chance?
Hundreds of owners are equipping their yachts and motor boats with
Pyrene. So write for free illustrated booklet, which will tell you how
you may save your boat from danger of destruction by fire. Write
today. Address



Pyrene Mfg. Co., 1358 Broadway, New York City



YOUR IDEAL MOTOR BOAT

Every motor boat owner—and prospective owner, has an ideal conception of the boat he would like to build. Whether large or small, thoroughly worked out or dimly perceived, it represents to him the acme of perfection in comfort, utility, convenience, and satisfaction. A man's individuality is more clearly expressed by his boat—especially if designed in conformity with his ideals—than by any other hobby he indulges.

Sometimes the ideal is impractical, as the owner finds out from bitter experience, particularly if he has had no one to advise him in his own interests. The Naval Architect is *his man*, and combines the owner's ideas with practical knowledge as to effect, to produce a boat of pleasing appearance and arrangement, with the most efficient form for the desired purpose.

During the past two years, I have designed more motor boats than any other architect and every one of these was built to suit the individual desires of its owner. These cover nearly every possible variation of design and arrangement to suit the requirements of the service for which they are used.

I can design a boat that will express your ideal and yield you the same individual satisfaction which is enjoyed by all my other patrons. The added value and pleasure will cost you no more than you would pay any other architect for the regular professional service of designing, inspecting and attention to details.

Let me prove my statements by referring you to my patrons and by sketches which will be submitted without obligation. All you have to do is to write me telling your requirements. You can save money by investigating my work at once. Do it today.

MORRIS M. WHITAKER

NAVAL ARCHITECT

1 MADISON AVE.

NEW YORK. U.S.A.

Telephone, 2008 Gramercy

DESIGNER OF

Aloha,
Amrita,
Audaciter,
Benitez,
Berkshire,
Betty II,
Blue Bird,
Blue Streak,
Buccaneer,
Bunk III,
Caroline,

Cito,
Dhila,
Dreadnaught,
Elithro,
Estelle,
Florence I,
Florence II,
Gracelda,
Hesperia,
H. M. T.,
Hurry,

Ida,
Inevitable,
Jacqueline,
Jess,
Kelpie II,
Kia Ora,
Kim,
Kittrois,
Kitcinque,
Kitsix,
Laura H.,
and many others.

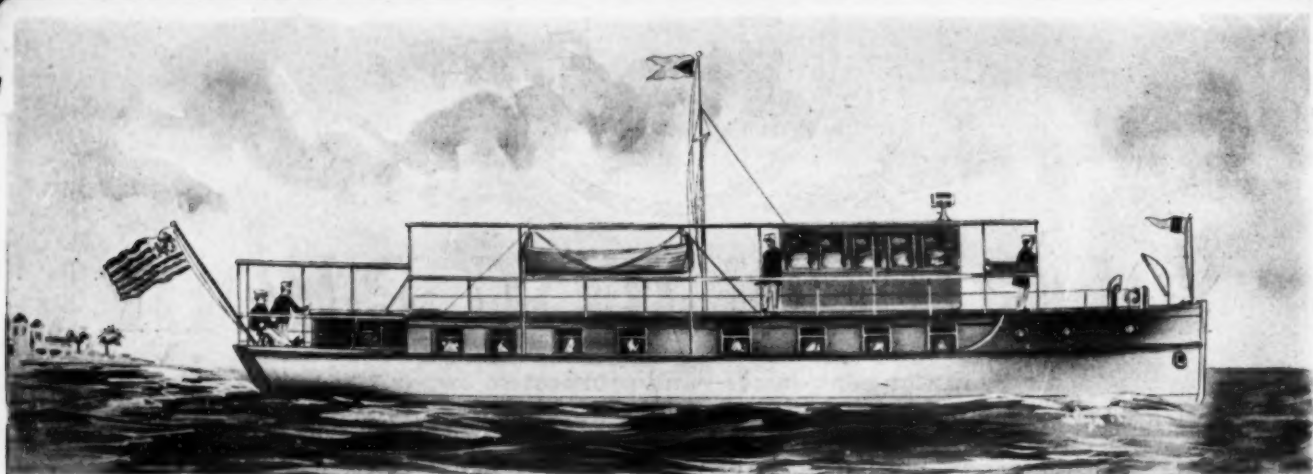
Lorelei,
Lynn II,
Macon,
Madelaine,
Mariada,
Marjolen
Martha,
Meb,
Mollie,
Oberon,
Prowler II,

Quest,
Seldomin,
Senga,
Silver Heels,
Soduska,
Tallahassee,
The Oak,
Titania,
Tramp,
Valeda,
Weepoose II,
Ziczack II,



When writing to advertisers please mention MOTOR BOATING, the National Magazine of Motor Boating.

In Florida This Winter



you will see several *distinctive* houseboats—the newest one of which is shown by rough perspective above. It was designed and is now under construction by us for Mr. A. J. Quackenbush, Schenectady, N. Y.

No 70-foot boat ever before built had so large and comfortable a living room (practically 18 feet square); such fine, large staterooms (3 in number); nor so low a first cost combined with such economy in running expense. With its shallow draft, its half removable deck house, its wonderful control, this boat is equally at home in the tortuous inland shoal waters of Florida, on the Mississippi, the Erie Canal, the Great Lakes or along the Northern Coast.

You can have a houseboat largely similar for your own use in Florida this winter, if desired. It is now under construction for spring delivery; but we could arrange to finish it, to your taste, for delivery in Florida this winter, if we hear from you promptly.

Possibly you are looking forward to spring and summer of next year—and considering the building of a boat, to be in readiness then. We have facts and figures that prove that

**rightly designed houseboats offer
more comfort, lower first cost,
lower running cost and a
greater range of use
than any same size
yacht afloat.**

It will pay you to get full information on the yacht-houseboat type, such as the 90-foot Ednada which has created favorable comment everywhere from Philadelphia north to the St. Lawrence. Or to get our booklet on the shoal houseboat Cocopomelo, which revolutionized houseboating in Florida last season. Or our leaflet on the Lodona type—which is midway between the yacht houseboat and the shoal houseboat.

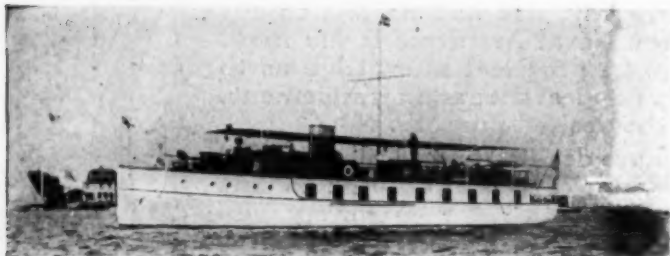
We specialize on houseboats and cruisers from 60 to 120 feet and have built some of the most notable boats of the size in the latter class. Full information on request.

State your wishes—we shall gladly offer suggestions—without placing you under any obligation whatever.

Mathis Yacht Building Company

[Specialist in 60 to 120 foot
Cruisers and Houseboats

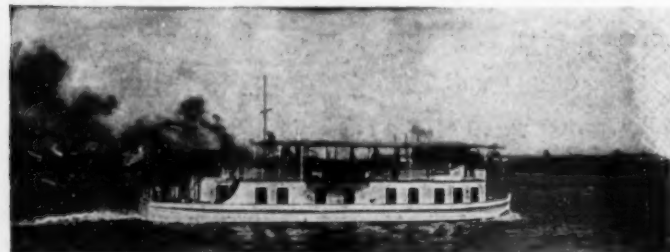
Cooper's Point, CAMDEN, N. J.



EDNADA III A 90-ft. yacht-houseboat designed, built and furnished by us in 90 days, for Mr. George C. Thomas, Jr. Conforms in height and width to Erie Canal requirements, has maximum draft for Florida use, and free-board and shutters for use at sea. Makes 12 miles an hour.



LODONA Designed and constructed by us for a prominent member of the New York and Larchmont Yacht Clubs. A 77-ft. houseboat, slightly yachting type than the Cocopomelo. Beam 15 ft., 6 ins. Draws 20 inches.



COCOPOMELO The pioneer shoal houseboat—which aroused such interest in Florida last winter. Designed and built by us for Mr. William Diston. A 70-ft. houseboat that draws only 18 inches; that makes 9½ miles an hour; that readily ascends the shallowest, most tortuous streams.



SYBILLA II —rated the finest 92-ft. flush-deck yacht in these waters. Designed and constructed by us for Mr. J. Fred Betz, III. Speed 15 miles.

When writing to advertisers please mention MOTOR BOATING, the National Magazine of Motor Boating.




**Our "Easy To Build" system will
save you over 50% in boat cost.
Send for our booklet "Boat Building
Made Easy" before you make any
further plans**

It explains the difference between the "Faultless Way" and the ordinary "Knocked-down way."

With the "knocked-down way" you must buy lumber, build molds, spend weeks in steaming and bending ribs and assembling loose parts, things which only an expert can do successfully.

With the "*Faultless Way*" the frame comes to you all erected, every rib bent to its exact position, sheer strakes, bilge clamps and garboard strakes all fitted and permanently fastened.

You can start planking in two hours.

We do the hard work by machinery—your part is *easy* and *simple*.

The character of the framework determines the worth of the boat.

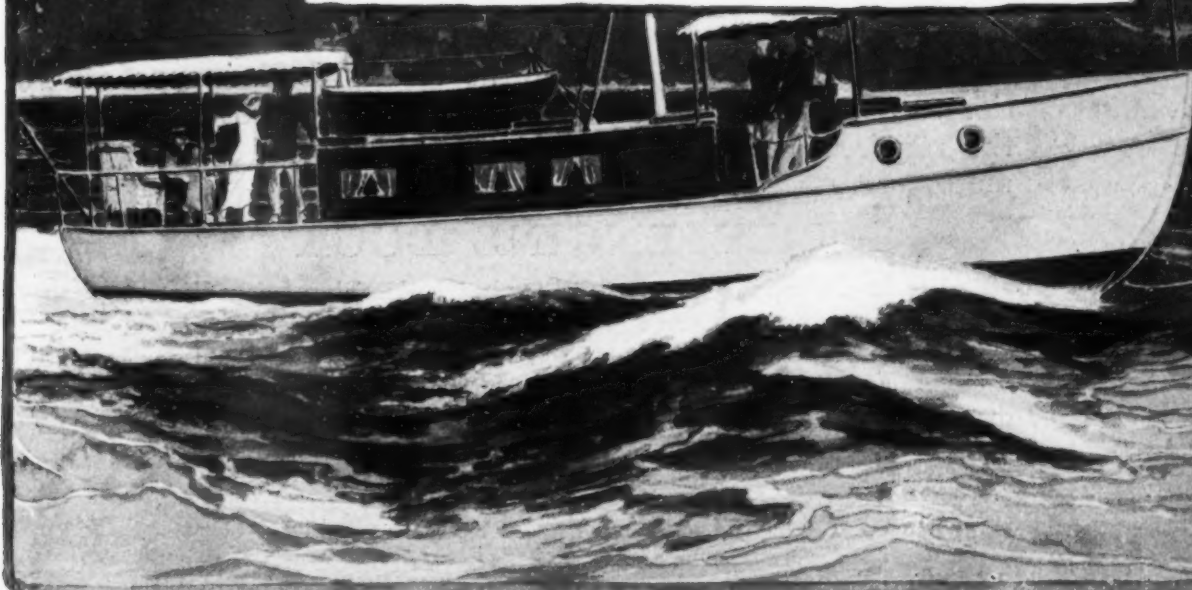
In our "*Easy To Build*" system this work is done by experts under the critical eye of our naval architect.

We relieve you of all drudgery and at the same time make it possible for you to build your own boat cheaper and better than in any other way.

We can furnish plans, parts, erected frames or completed hull for all kinds of boats—*speed boats, launches, cruisers, passenger* and tug-boats; also gasoline motors.

Our boats are all designed by a well-known naval architect and built by experienced men who know how.

Valley Boat and Engine Co.
600 Hess Street Saginaw, Mich.

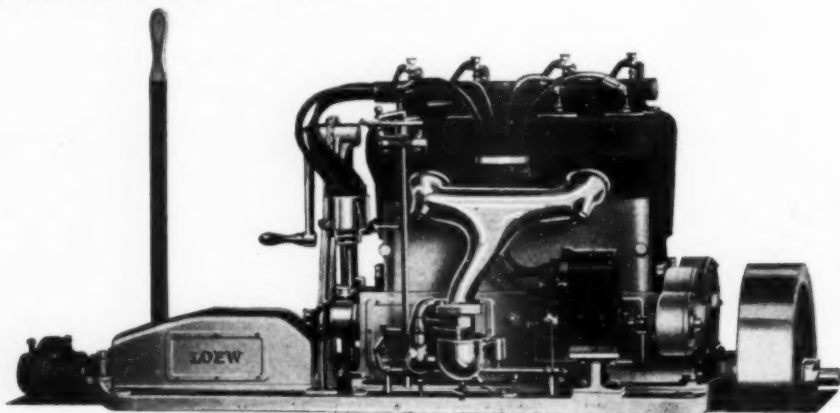


When writing to advertisers please mention MOTOR BOATING, the National Magazine of Motor Boating.

Loew-Victor Engines from Design to Finished Workmanship set a Standard for Marine Power



HERE'S the engine that is the life of the motor boat for either hard work or play. It lives up to its contract 365 days in the year and delivers more than the most exacting expect. It assimilates punishment on hard duty to the amazement of old-timers. The man who can tell a motor when he sees it, picks the Loew-Victor every time. No test is too severe for it. No condition can arise to embarrass you if the Loew-Victor is pulling or pushing your boat. You can lay back and enjoy the scenery. On hundreds of rivers, lakes and harbors in this country, owners of Loew-Victor engines are showing their friends what a real motor is, how it acts, how it saves time, repair, money and pleasure.



SPECIAL TWENTY-THIRTY H. P. LOEW-VICTOR.

In design and workmanship the Loew-Victor is superior to any marine motor built. It satisfies most fully the requirements of the motor expert as well as the motor user.

FREE ENGINE BOOK

We have a copy for you. Send for it. It describes Loew-Victors fully—shows you just the engine you want at a price less than you expect to pay. Once you understand the construction of the Loew-Victor you will appreciate thoroughly the many good reasons why they surpass all others. Write now.

THE LOEW MFG. CO.,

1907 Madison Ave.

—

—

CLEVELAND, OHIO

When writing to advertisers please mention MOTOR BOATING, the National Magazine of Motor Boating.

THIS REVERSE GEAR Has a World-Wide Reputation

IN EVERY CLIME—on all kinds of boats—the Baldridge Reverse Gear has made itself indispensable. It can be depended upon—that's the big important reason. The owner of a pleasure launch finds it gives his boat the flexibility of an automobile—prevents collisions—doubles the pleasure of a cruise. It doesn't sling oil—can't catch his clothes—runs quietly always. And certainly the sturdiness and absolute dependability of the "Baldridge" recommends it for heavy duty craft.

Before shipment every

Baldridge
Reverse Gear

is tested under conditions more severe than it could possibly meet in actual service. This insures a large factor of safety to the user. To the marine engineer this test is more evidence of "Baldridge" Reliability. It makes him feel safe in specifying the "Baldridge," and in staking his reputation upon its performance. He knows the "Baldridge" is years past the experimental stage.

Our export department is fully competent to take care of the many detailed requirements of the export trade. They stand ready to co-operate with you in every practical way. Correspondence is carried on in all languages.

Dealers everywhere are eager to stock up with "Baldridge" gears because of their universal demand. Just now we need a few more responsible agencies in valuable territories.

Write or cable for information
and our 1912 export campaign

Special Points of Construction

Gear is entirely enclosed—can't sling oil or catch the clothing.

Only one shaft—it extends unbroken through entire length of machine. Cannot sag, heat or grind out bearings.

Gear cage couples direct to engine crank. Fitted with step gear on each side, producing perfect balance and eliminating side strain and vibration.

Expanding levers turn on rollers, thus eliminating bearing friction and giving true

outward expansion. Can't bind, cramp or spring.

Stub tooth gears of extremely tough steel accurately cut—quiet running.

Lubrication by splash system. Wick packing between sections of case prevents oil from seeping out.

Alignment is absolutely permanent, owing to the single unbroken shaft resting in extra long bearings.

Made compact and light without sacrificing strength or durability.



Off for the day!



In crowded waters!



Making a landing!

**"The gear
to bear
the wear
and tear"**



THE BALDRIDGE GEAR COMPANY

(Formerly Smith & Baldridge Machine Co.)

Export Office: 47 Broadway, New York City, U. S. A.

General Offices and Factory: 676 West Grand Boulevard, Detroit, Mich.

Cable Address: "Portumex," New York—Western Union or Liebers Code

Belle Isle Motors

for 1912

In our line are but four models, but in these we offer you the very best that long experience in the manufacture and use of marine engines can produce.

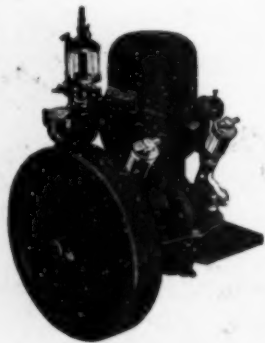
There is no doubt about the Belle Isle Motors. They are today giving satisfaction to thousands of owners all over the country.

Simplicity, which with proper designs means reliability, is the one outstanding feature of the Belle Isle Motors.

We are so confident that one of these motors will satisfy you in every respect that we are willing to send it to you on thirty days' free trial. If it doesn't please you—**YOU THE JUDGE**—then you will not be out one cent.

Best Motor of Its Size Ever Built

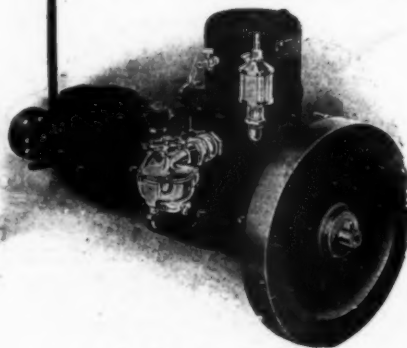
This is the Belle Isle Motor No. 1. It has proven by actual service to be the very best small marine engine ever produced. We spare no expense in our efforts to make it the very highest quality in every particular. It is only 11 inches high and weighs but 73 pounds. At normal speed it will develop from 2 to 2½ H.P. It is the ideal engine for ordinary rowboats and 14-18-foot launches. This motor will carry the boat at a speed of from 5 to 8 miles an hour.



Sent to you on 30 days' free trial—price, complete engine with boat fittings - **\$47**

Send for our catalog which describes these famous motors. When you know how they are made and the materials which are used, you will understand why they are so popular everywhere. Write today while you are thinking about it.

An Ideal Motor for Your Launch



Built after the same model as our No. 1, but larger and more powerful. It is exactly what you want for an 18-23 foot launch. This motor will send your launch along swiftly without any bother, fuss or worry, easily making from 6 to 8 miles an hour.

From the center of the crank shaft it is only 14 inches high, and weighs only 125 pounds. Will develop from 4 to 5 H.P. running at normal speed. Every part is very strong and as simple as possible. Price, complete with boat fittings..... **\$69**
Reverse gear, \$12 extra.

Belle Isle 5-6 H. P. Motor

This motor has been designed to meet the demand for a slow speed, heavy duty service. It is suitable for fishing boats and ferries. It is well made, strong, durable and extremely reliable. This motor is made especially for the man who must have the best of service all the time, under all conditions of weather. Sent on thirty days' free trial, complete with boat fittings..... **\$93**
Reverse gear, \$12 extra.

Double Cylinder, 10 H.P.

Here's a motor, Belle Isle No. 4, which will drive a 24 to 26-foot launch at a speed of from 8 to 10 miles per hour. It is a double cylinder and has no pipes—valves—nor gears. You will find this model extremely neat and compact. The simplicity of construction and high quality of all materials used account for its wonderful reliability. On thirty days' free trial, complete with boat fittings..... **\$155.50**

Concrete Form & Engine Co.

12 Motor Boat Lane

Detroit, Michigan

EVERYTHING

in Marine Hardware, Supplies, Accessories,
Equipment, Tools and Specialties for

Motor Boats—Yachts—Ships—

Motor Boatmen, Yachtsmen, Ship Yards, Boat Builders, Manufacturers, Supply Dealers, Fishermen—

Get Our 550 Page Catalog

No matter what your interest in boating, as a pastime, a sport or a business occupation, you will find both pleasure and profit in the possession of our big 550 page catalog. Our catalog is a complete dictionary of everything used in connection with boats of any size. It illustrates and describes thousands of different articles, with dimensions, prices and much other valuable information. After you have seen this book, you will think you can't do business without it.

We have the greatest variety and largest stock of marine goods to be found in the world, enabling us to fill all orders promptly and to sell economically. Our prices are always lowest, quality considered. We have been in this business for 67 years and are better equipped to give you first class service than any other house.

Catalog sent free on receipt of six cents to cover cost of mailing. Send for 1912 edition; ready January First

A. S. MORSS CO.

222 COMMERCIAL STREET

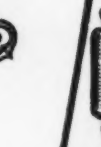
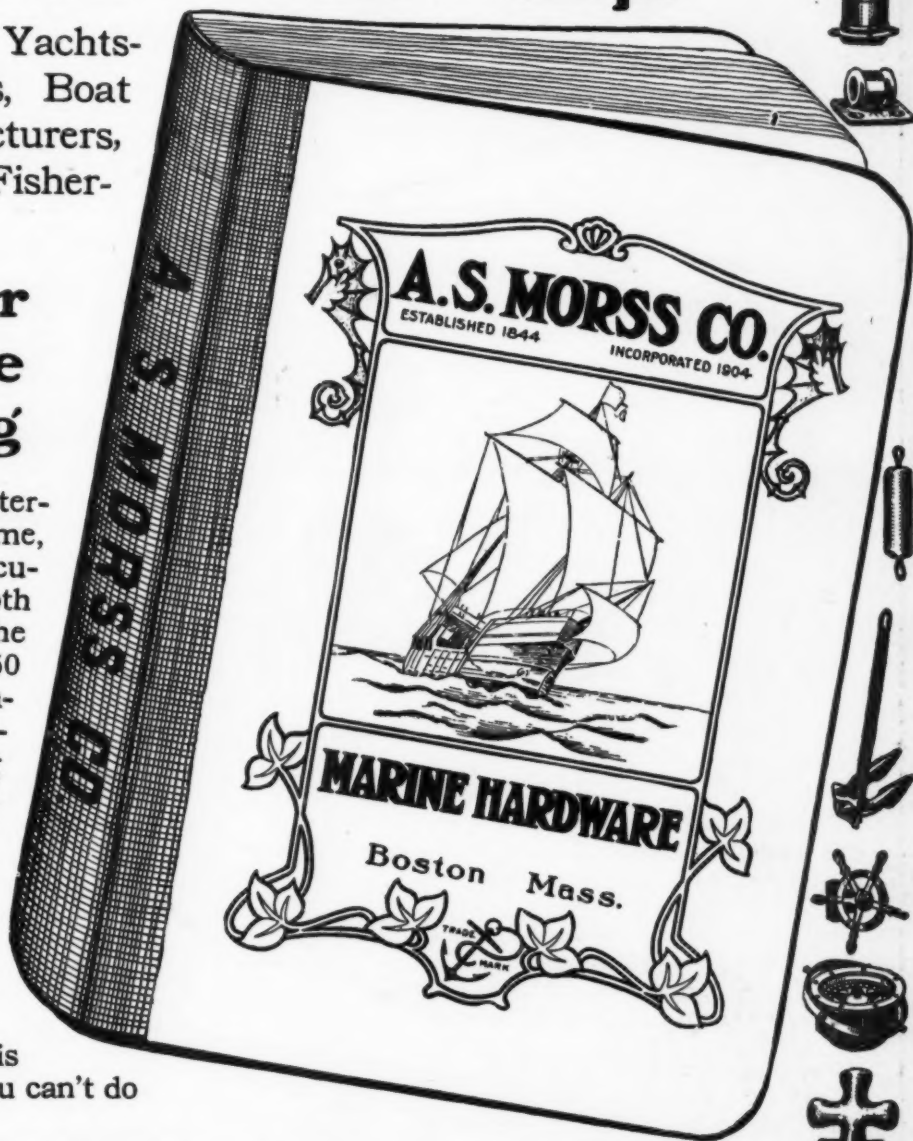
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BOSTON, MASS.

When writing to advertisers please mention MOTOR BOATING, the National Magazine of Motor Boating.

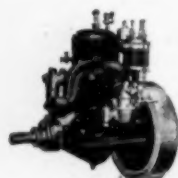


MORSS
BOATING
CO.

Did You Get Yours?

The Dean Manufacturing Company distributed several thousand circulars on November 15, 1911, describing **Fox Motors (simplified) for 1912**—did you get yours? We are prepared for a large business this season and want your orders for **Heavy Duty Motors, Medium Duty, Semi-Speed Motors, Light High Speed and Aero Motors.**

The Most Complete Line in America

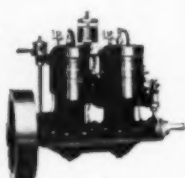


Fox Motors

Specials

Excel all others
for small boats

3 1/2 H.P.

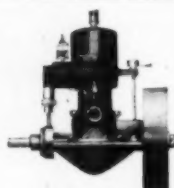


7 H.P.

Fox Heavy Duty Motors

5 to 7 H.P. } Single Cylinder
9 to 12 H.P. }

Excel for heavy boats of all
kinds.



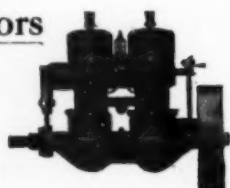
5 to 7 H.P.

Fox Heavy Duty Motors

Two-Cylinder

10 to 14 H.P.
18 to 24 H.P.

For Fishermen and for all
Commercial Trade



10 to 14 H.P.

Just a Few Words From Users

When it comes to power and push give me a Fox.
If I bought 100 engines I would always buy a Fox.
My engine ran 22 hours in a heavy sea.
Easiest starting engine at this place.
Four years' use and no repairs of any kind.
There will be more Foxes here next year.
The fourth port is a wonderful improvement.
Less fuel, no trouble whatever with
my Fox.
Have won three cups in nine days.
Fine on long runs and rough weather.
Brer Fox holds the World's Endurance
Record.



**Fox Motors Are Sold by Many Boat Builders
and Agents. Is Your Location Represented?**

Write for Information

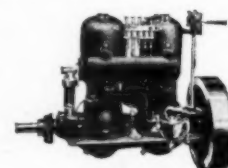
New York: Breese Bros., 38 E. 23rd St.
Boston: American Marine Equipment Co., 27 Haverhill.
Philadelphia: C. A. Kilmer, Bourse Bldg.
Chicago: Jas. M. Wain & Co., 1205 Michigan Ave.
New Orleans: C. B. McCrocklin, 121 N. Carrollton Ave.
Seattle: Manny Meyers, 520 First Ave., South.

Fox Medium Duty Motors

With the Fox Fourth Port

7 H.P. 1 cyl.
10 H.P. 1 cyl.
8 H.P. 2 cyl.
14 H.P. 2 cyl.
20 H.P. 2 cyl.

Try one



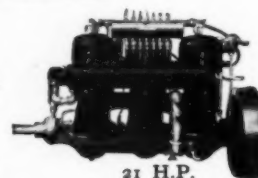
8 H.P.

Fox Medium Duty Motors

With the Fox Fourth Port

21 H. P. Three Cylinders
30 H. P. " "

Four Cylinders to order



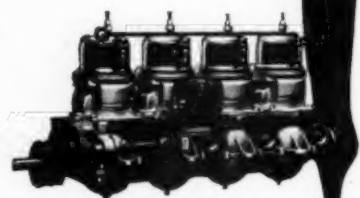
21 H.P.

Equipments

A service department at the factory will
look after the little things you order with
your motor — Clutches, Rear Starters,
Magnetoes, Boat Outfits, Aluminum Parts,
etc.

Fox De Luxe Motors

24 to 90 H.P.
4 to 6 cylinders



50 H.P.

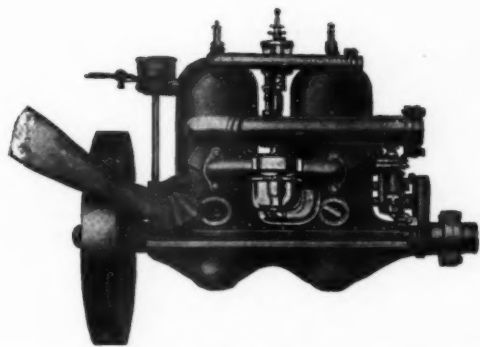
SPEED BOATS HYDROPLANES
HYDRO - AEROPLANES
AEROPLANES

Complete equipments to order

Name
Address
Please send your 1912 Printed Matter and quotation on
FOX MOTORS (simplified) FOR 1912.
My boat size.....
Horse Power
I want a speed of about miles per hour.

THE DEAN MFG. CO. "South Cincinnati"
221 FRONT ST. (or nearest agent) NEWPORT, KY

The new Vim yet more efficient more satisfactory



STANDARD
Ten types—one to four cylinders, 3 to 36 H. P.

HEAVY TYPE
Four types—one to three cylinders, 3 1-2 to 18 H. P.

EXTREME HIGH SPEED
Five types—two to four cylinders, 13 to 55 H. P.



If you do not know the Vim at first hand, you know it at least by reputation.

And you know that the Vim owner is invariably a satisfied owner; and that he rarely buys any other make when he puts a new engine into his boat.

If the Vim had been an engine of indifferent efficiency and economy and power, this could not be true—the man who tried one would not try another and another, as Vim owners usually do.

So when we say the new Vim for 1912 is yet more efficient and more satisfactory than preceding models, you can accept it as fact that it bears precisely the same relation to other makes.

The simplicity of the Vim is too well known to require comment here, except to say that the new model is as simple as its predecessors.

THE IMPROVEMENTS ARE NOTEWORTHY:---

Non-backfire device that renders backfiring absolutely impossible under any conditions.

Corrugated flywheel rim to facilitate easy starting.

Magneto and battery ignition through separate spark plugs.

Convenient lever control of spark and gas.

Water jacketed exhaust manifold and pipe.

Solid cylinder heads — preventing leakage and loss of compression.

A lubrication system by which the oil goes into the cylinders in a fine spray with the gas.

We sincerely believe that no other boat engine affords these advantages, coupled with the sturdiness, simplicity and reliability that have given the Vim its high repute.

The new catalog describes them in detail.

Write for it—you need it before you buy an engine for next season, if you want the biggest value for your money.

REPRESENTATIVES

Southwestern New York, Connecticut and
Northwestern New Jersey
F. A. BAKER & CO.
10 Warren Street, New York City
Portland, Me.
G. D. THORNDYKE MACHINE CO.

Central New York
W. D. DUNNING
Syracuse
Baltimore, Md.
F. P. BURTON

Northwestern Washington
MARINE SUPPLY CO., Tacoma
Northwestern Ontario
CAPITAL BOAT WORKS, Ottawa, Ont.
Philadelphia, Pa.
W. S. CARMAN, Bourse Building

Quebec
I. L. LALEUR, Ltd.
Oregon
GAS POWER & SUPPLY CO.
Portland

The VIM MOTOR COMPANY
4 WATER ST. SANDUSKY, OHIO

When writing to advertisers please mention MOTOR BOATING, the National Magazine of Motor Boating.

Biddle **MONEL METAL** Propellers

Non-Corrodible

Stronger than Bronze

Shine like Silver

Every Motor Boat or Yacht That Lays Any Claim
to "Class" Should Have a Biddle Propeller

Biddle Propellers are made of Monel Metal—the wonderful new metal that has the strength of steel and the lustre of silver. Designed on scientific principles and retaining a polished, glassy surface, the Biddle wheel gives a degree of efficiency hitherto unknown. It never rusts or corrodes—stays smooth and bright year in and year out.

A new epoch in boat propulsion has been created by Monel Metal. This natural alloy of nickel and copper (67 per cent nickel) is three times as strong as bronze and is vastly superior to that metal in anti-corrosive and anti-fouling properties. So remarkable are its properties that the United States Navy now uses Monel Metal propellers on its warships, while other navies are fast adopting them.

Wheels Scientifically Designed

Seeing the great field for this non-corrodible propeller on motor boats and yachts, the Biddle Hardware Company, distributors of Monel Metal, now manufacture a series of stock wheels that have no equal for appearance, durability and driving efficiency.

The services of the ablest naval architects were enlisted to design these propellers with scientific accuracy. They are the only stock propellers in existence whose driving surfaces are *planed* to make the blades absolutely true to pitch. A specially designed machine does this planing and insures mathematical exactness in the pitch of each blade.

On account of the great strength of Monel Metal, the Biddle Propeller blades can be thinner than those of any other propeller. Ground and polished to knife edges, they cut the water with minimum friction, thus getting the utmost out of every engine stroke and driving the boat with maximum power.

Surface Always Bright

The non-corrodible feature alone of the Biddle Propeller puts it in a class of its own. A bronze wheel will turn green from the action of the water, but the Biddle propeller keeps its smooth surface and silvery lustre in fresh or salt water, defying acid conditions and all other corroding influences.

The Biddle Propeller means greater speed, greater efficiency, greater satisfaction. It is the most expensive propeller in first cost, but the most economical in the end.

Write for further information. Special designs of propellers, either right or left hand, will be furnished to suit any particular requirement.

In addition to Monel Propellers, we manufacture a complete line of improved boat hardware of this non-corrodible metal—chocks cleats, rail stanchions, etc. They shine like silver and never corrode.

Biddle Hardware Company, Philadelphia

6th AND COMMERCE STS.

(Established 1837)

Branch Offices

LONDON

STOCKHOLM

MONTREAL

NEW YORK

CAILLE

At Last!

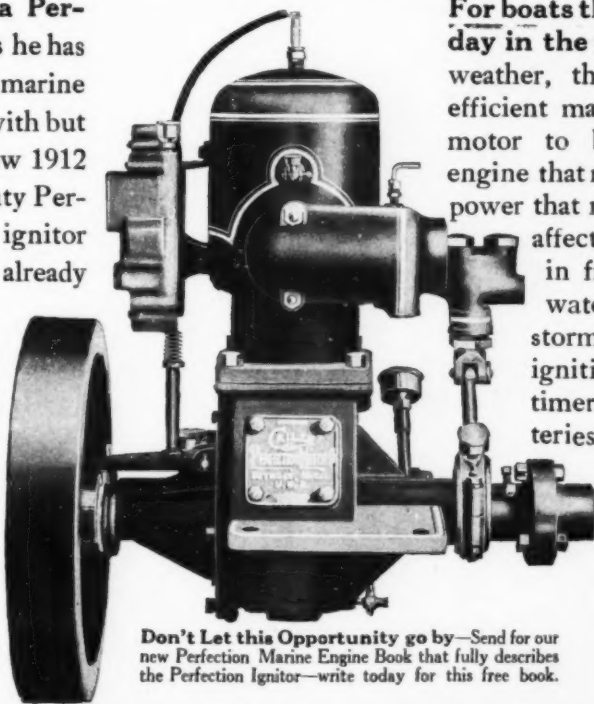
An Ignition System That Is Waterproof

No Batteries—No Magneto—No Timer—No Coils

Nothing to get out of order—only one wire on whole ignition system. The 1912 Perfection Motor and Perfection Ignitor combine to make a guaranteed trouble-proof heavy duty power plant for tow boats, fishing boats, oyster boats, ferry boats, work boats and all craft contending with severe weather conditions.

Our 8-Horsepower for 1912—\$140

The man who owns a Perfection Motor knows he has absolutely the very best marine power on the market with but one exception—the new 1912 8-horsepower heavy duty Perfection with the new ignitor equipment which has already demonstrated both here and abroad to be superior to every other marine engine built irrespective of price—we challenge comparison. This new Perfection simply thrives on hard work—there are no complicated parts to get out of order.



Don't Let this Opportunity go by—Send for our new Perfection Marine Engine Book that fully describes the Perfection Ignitor—write today for this free book.

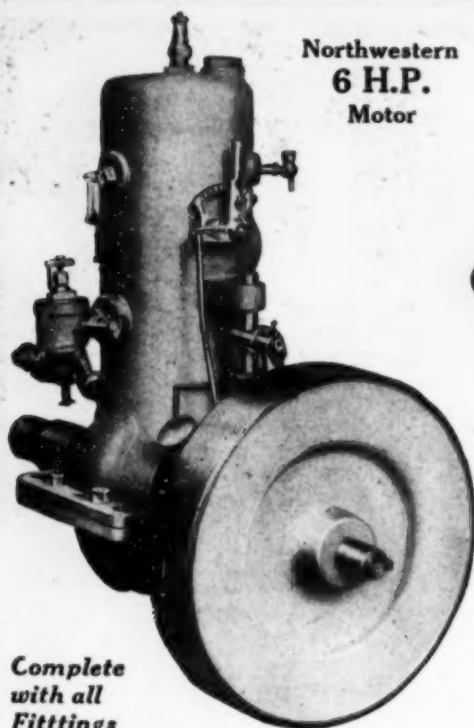
For boats that must be used every day in the year in both fair and foul weather, this simple, durable and efficient marine power plant is the motor to bank and rely on—an engine that requires no tinkering—a power that neither heat nor cold will affect—it works equally well in fresh or salt water, tide-water or stream, calm or storm—an absolute waterproof ignition system—no coils—no timer—no magneto—no batteries—nothing to get out of kilter—heavy duty 8-horsepower—and the price is just \$140 complete and ready to run the moment you install it in your boat. It's the really one efficient power for big profit.

CAILLE PERFECTION MOTOR COMPANY

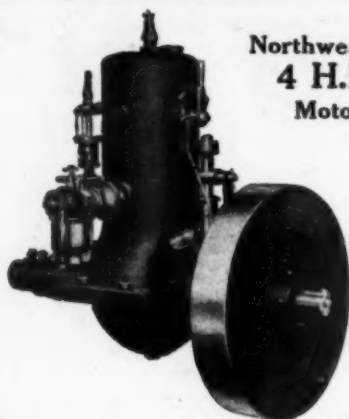
103 CAILLE STREET., DETROIT MICHIGAN

PERFECTION

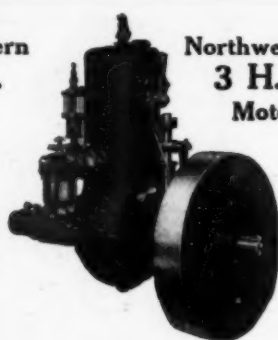
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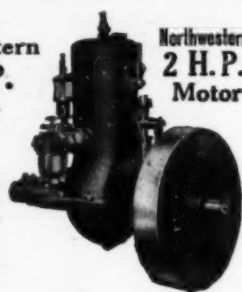
Northwestern
6 H.P.
Motor



Northwestern
4 H.P.
Motor



Northwestern
3 H.P.
Motor



Northwestern
2 H.P.
Motor

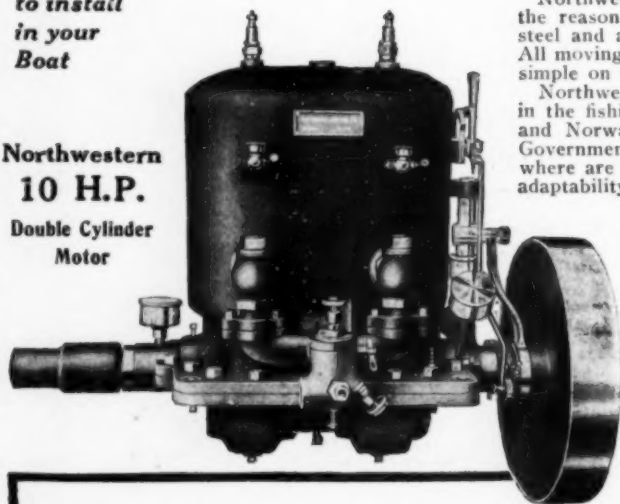
*Largest Engine
Builders in
the Northwest*



*Complete
with all
Fittings*

*Ready
to install
in your
Boat*

Northwestern
10 H.P.
Double Cylinder
Motor



"Extra Efficiency" Northwestern Motors

Northwestern Motors are "extra efficiency" for the reason that the castings used are of semi-steel and as close grained as the hardest wood. All moving parts are fitted exactly in each engine. The engines are the most simple on the market and will make the round trip every time.

Northwestern Motors are in use in every country in the world. They are in the fishing service on the Atlantic and Pacific coasts in America, Sweden and Norway, Argentine and New Zealand, and are installed in Police and Government boats, and in many inland cities. Thousands of pleasure boats everywhere are equipped with the wonderful Northwestern Engines, proving their adaptability for all kinds of service.

2 H.P. Northwestern Motor \$39.00

The most startling engine offer ever made—a real engine—big and powerful and not a toy in any sense. Compares in weight and measurements with engines costing nearly double. Do not be confused with 2-H.P. engines advertised at \$25—made just to compete with the Northwestern. The cheap engines are like "watch charms" in comparison with the wonderful Northwestern, and are expensive at \$25.

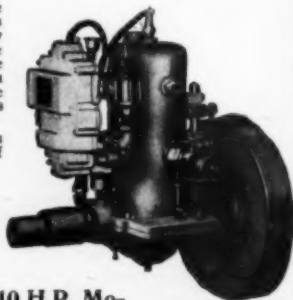
20 H.P.--10 H.P.--6 H.P.--4 H.P.

and 3 H.P. proportionately low priced

The Northwestern Special Wico Ignitor

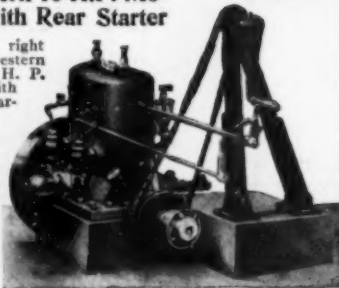
This ignition is absolutely waterproof and the engine may be started direct from the magneto, eliminating the use of batteries entirely. The additional cost of this equipment is merely nominal and is worth the price as it eliminates the possibility of ignition troubles entirely, as the unreliable dry cell is eliminated.

Very attractive prices on the complete line of Northwestern Special this season equipped with either Wico ignitors or Perfix water ignition system, Ther-mix Silencers, etc.



The Northwestern 10 H.P. Motor Equipped with Rear Starter

The cut to the right shows the Northwestern double cylinder 10 H.P. engine equipped with rear starter. It is arranged so that it can be installed under the hood and commutator relief cock and the engine operated wholly from the bulk head. Very attractive prices for the engine with this equipment.



30 DAYS' FREE TRIAL

Absolutely thirty (30) days' free trial on any Northwestern Engine and you do not need to send us one cent. We have a special proposition that we are going to make all during the season of 1912 that will enable you to try the engine out thoroughly at our risk, and we will accept the return of the engine for any cause without any quibbling. Thousands have accepted our liberal offer and not one engine has been returned. The largest boat-builders throughout the United States are specifying Northwestern Motors in their stock boats. You can buy a Northwestern Engine on its record and be sure that you are going to get your money's worth.

1912 Catalog Free

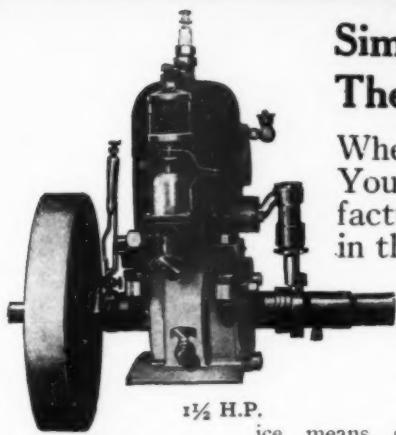
Write at once and get our new 1912 catalog describing in detail these wonderful engines. You can actually save from 15 to 35% and have an engine on which you can bet your last chip. Do not think of buying an engine until you investigate the "extra efficiency" Northwestern and have an opportunity to examine this splendid catalog which illustrates the new four cylinder 20 H. P. engine. Please write your name on a post card.

NORTHWESTERN STEEL & IRON WORKS

750 SPRING STREET
EAU CLAIRE, WIS.

C R A G G

HIGH SPEED MOTORS



\$37.00
Full Equipment

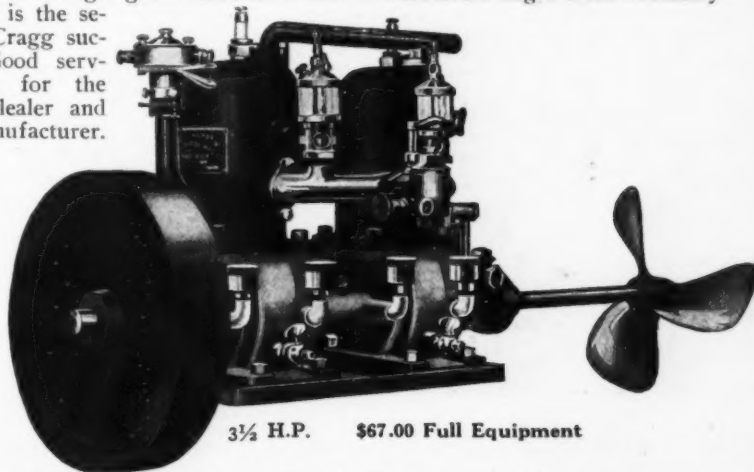
There is a selfish purpose back of the quality we put into Cragg Motors, the high grade design, workmanship, finish and equipment. We know that our success as manufacturers depends upon the success of our motors. That's why we offer the perfection of motor production in Cragg Motors and would build them even better if it were possible to do so.

Cragg Motors have all the high grade features and latest improvements of the higher

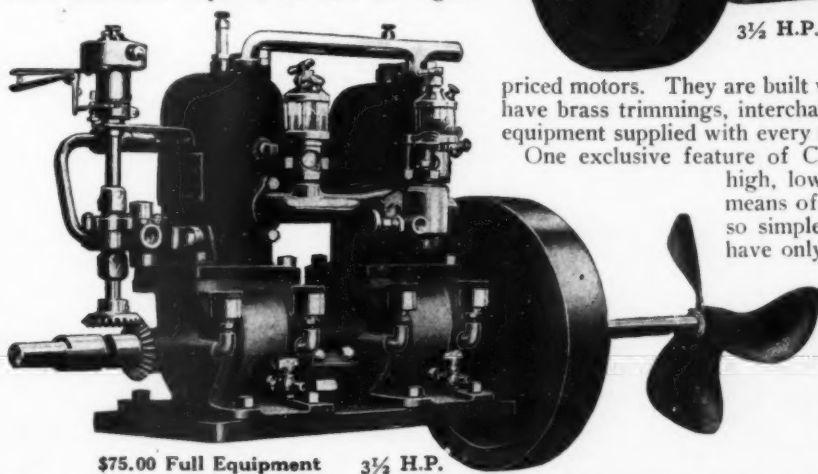
**Simple, Handsome, Powerful, Durable, Reliable
The Best Marine Motors Possible to Produce**

When you buy a Cragg Motor you don't buy an experiment. You buy a motor that has not only been tested by the manufacturer but has been proven the height of motor perfection in the real test of every day service.

Cragg Two-Cycle Three-Port Motors are built primarily for service and satisfaction, and that is what they give. They are built a little better and backed with a little stronger guarantee than some manufacturers might think necessary—but that is the secret of Cragg success. Good service means satisfaction for the owner, profit for the dealer and success for the manufacturer.



3 1/2 H.P. \$67.00 Full Equipment



\$75.00 Full Equipment 3 1/2 H.P.

priced motors. They are built with either iron or aluminum bases and have brass trimmings, interchangeable bronze bearings and the complete equipment supplied with every motor is of the highest class in every detail.

One exclusive feature of Cragg Motors is that they reverse, run on high, low or medium speed, stop and start—all by means of only one control lever. This makes them so simple that any child can handle them. They have only three moving parts and are the simplest in construction of any motors on the market.

If you are an owner looking for the best motor for your boat, or a dealer looking for a high grade profitable line of small engines, don't take action until you have secured full information about Cragg Motors. Write us to-day.

We have still some territory open for Agents.

We also manufacture the heavier motors in six models from 4 1/2 to 36 H.P. with 1, 2 and 3 cylinders.

Write us today for our catalogue:

Motors from 1 1/2 to 30 H. P.

Gilmore-Cragg Motor Mfg. Co.

601 Wayne County Bank Building

Detroit, Mich., U. S. A.

"Write us for our saving payment plan."



AMERICAN

DETROIT

Turn Your Rowboat
Into a Motor
Launch for **\$45.00**

YOU can do it easily
with a 2 horse-power
American Detroit
Marine Motor—the low-
est priced, simplest,
strongest, most dur-
able, most de-
pendable
marine
engine
built

**American Detroit Marine
Engines are made in
the following sizes:**

Single Cylinder		Double Cylinder	
2 h. p.	\$ 45.00	8 h. p.	\$158.00
4 "	65.00	14 "	215.00
6 "	93.00	20 "	295.00
8 "	123.00		

The prices include complete
outfit of everything nec-
essary to install
and operate
them..

Although the
name is new to you, this
engine has been made for over
15 years.

Our output has heretofore been sold through jobbers
under their name; now we are going to advertise and sell
it direct, and you will get the benefit of dealing directly
with the factory.

**Let us send you an American Detroit Engine
on a 30 days' free trial.**

If you are not entirely satisfied with it in every respect, return it and we will
refund your money.

These engines represent the very highest development in a 2-cycle design.
Can fit out any work or pleasure boat up to forty feet long. They are extremely eco-
nomical, have few moving parts, few wearing surfaces, so that it is almost impossible
to wear them out; they will outlast hull after hull.

They are extremely easy to operate—no experience necessary.

Good Agents Wanted in Every Locality

We have just published a Book on "Marine Engines,
Their Construction and Operation." Send for it.

American Engine Company
104 Boston St., Detroit, Michigan
U. S. A.

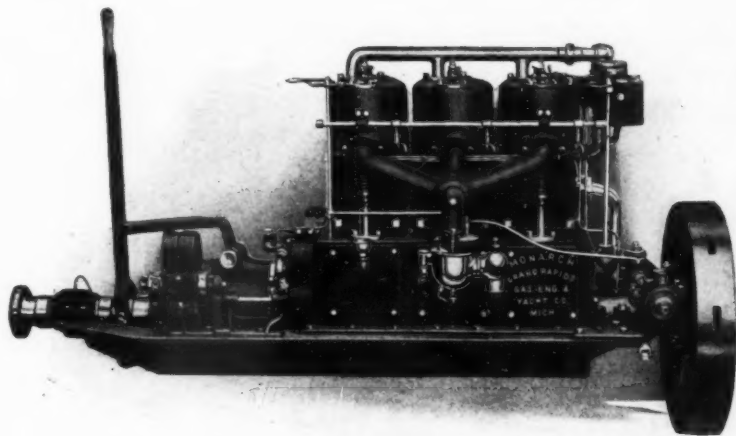
8 H. P.—\$158.00 Complete

2 H. P.—\$45.00 Complete

MONARCH

FOUR CYCLE

"Continuous Service" Marine Engines



THE most notable characteristic of Monarch Engines is aptly put in the phrase "Continuous Service." Service is what you expect when you buy a marine engine—what you pay your money for—so why be satisfied with anything else.

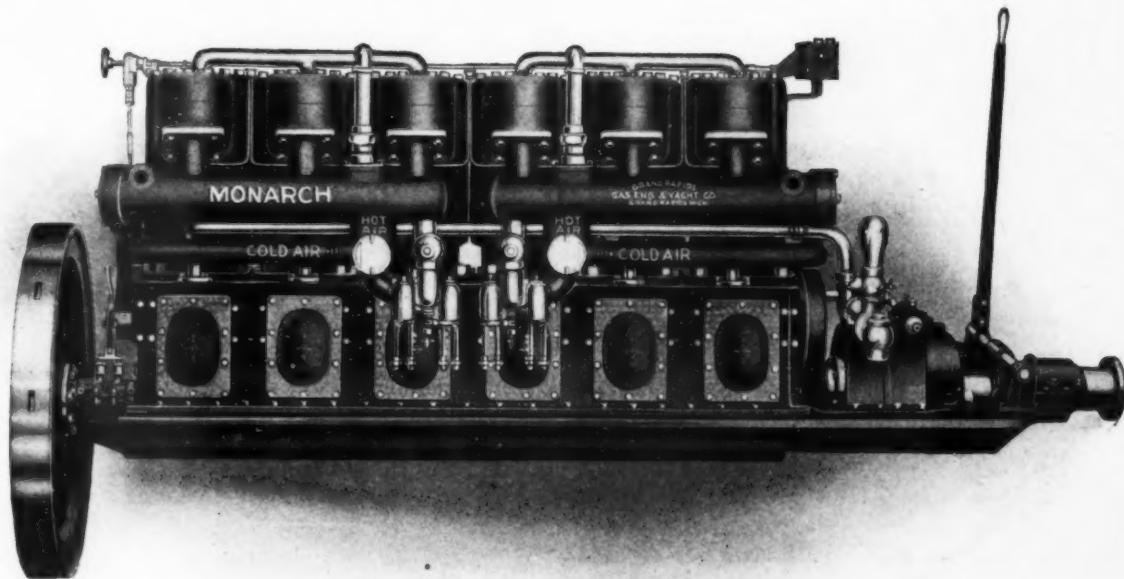
"Continuous Service" as interpreted by Monarch Engines means not only steady, reliable running under load for hours at a time, but a readiness for the same strenuous performance, every day in the year.

Monarch Engines are made in single and multiple fuel types. The single fuel models can be fitted for the use of either gasoline, petrol, naphtha, benzine, alcohol or number one distillate. The multiple fuel engines are so designed that by a simple turn of a special by-pass or three-

way valve they run equally well on kerosene, paraffine, petroleum, lamp oil, insurance oil, number two distillate, etc. With any of these fuels they give the same characteristic Monarch efficiency and reliability, while the economy and convenience of using various fuels fits them for both pleasure and commercial use in all parts of the world.

There are seventeen models of Monarch Marine Engines, ranging from 5 to 150 H.P., in one, two, three, four and six cylinder models, so that there is a Monarch Motor especially adapted for each size and type of boat. In general features of design and construction they are all the same—the best. Make and break ignition, mechanical valves, large bearing surfaces, governor controlled as well as independent throttle—are a few of these features.

Write today for the Monarch Catalogue



Grand Rapids Gas Engine and Yacht Co.
108 FRONT ST. GRAND RAPIDS, MICH., U. S. A.

EASTERN SALES AGENCY, 133 LIBERTY ST., NEW YORK CITY

GRAY

MARINE MOTORS

Made in the largest plant in the world devoted exclusively to the manufacture of 2-cycle motors.

Here's a motor that is bound to interest the man who is going to equip a work boat of any kind. Especially designed and built for the hardest kind of work --- not a weak spot in the whole outfit.

Has a crank shaft strong enough for a 12 H. P.—every part designed to stand twice as much strain as you could possibly give it.

A powerful—quiet—smooth running motor that is noted for its fuel economy—simplicity and accessibility. Big pump capacity—any part cool enough to touch at any time.

We want to hear from the man whose income depends upon the working of a gasoline engine—the man who demands and must have absolute reliability—the man who has no time to tinker and fuss with an unreliable gasoline engine.

We want the chance to go into details and tell you all about this.

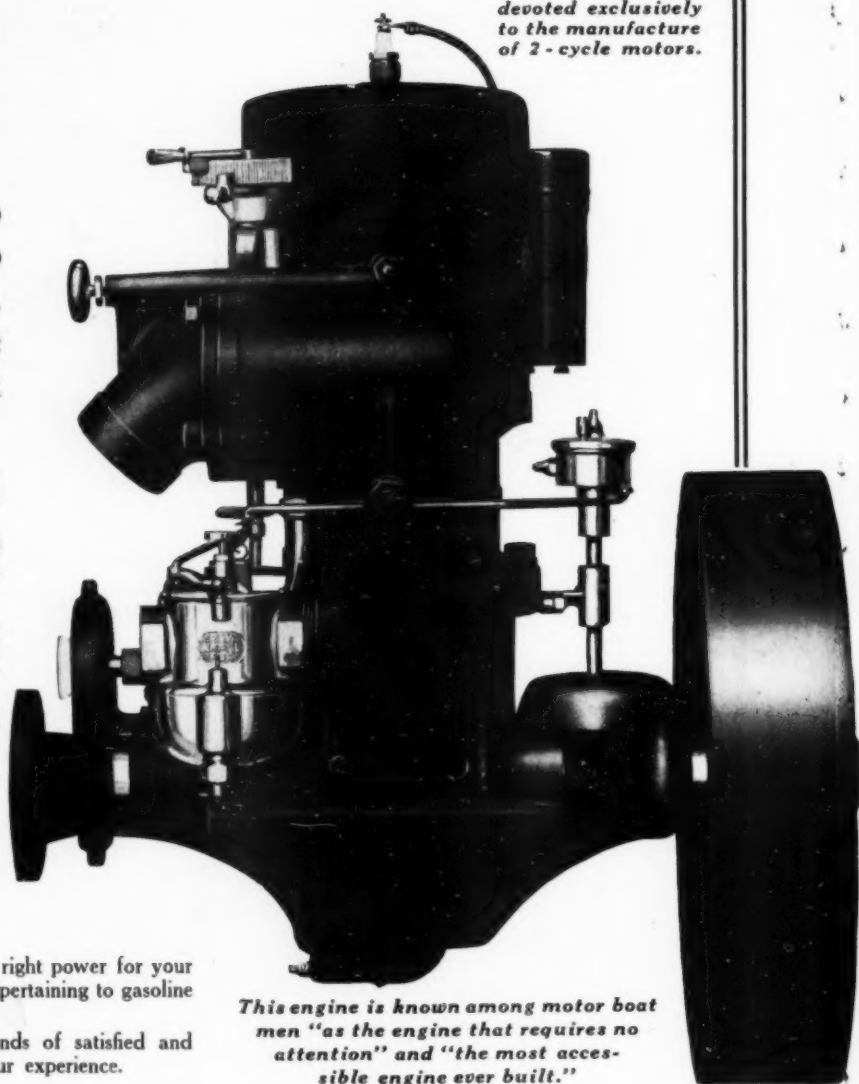
8 H. P.

Model "T" Special Heavy Duty Motor—a chunky, heavily built motor for Fishing Boats—Ferries, Towing or Work Boats of all kinds. Price with complete outfit all ready to install

\$152.00

We can give you some mighty valuable help in selecting the right power for your boat—don't hesitate to write us at any time and on any subject pertaining to gasoline engines.

We have been in the business for years and have thousands of satisfied and enthusiastic customers—you might as well get the benefit of our experience.



This engine is known among motor boat men "as the engine that requires no attention" and "the most accessible engine ever built."

	3 H. P., guaranteed to develop 4 H. P. Complete outfit	\$60
	6 H. P., guaranteed to develop 7 H. P. Complete outfit	\$89.50
	12 H. P., A powerful two cylinder motor that will develop 13 to 16 H. P. Price complete outfit	\$188
	MODEL "T" Made in 1, 2 and 3 cylinders, 7 to 36 H. P. Price with complete outfit	\$115 and up

Power Plants for Large Boats

Ready for immediate delivery—a large stock of three-cylinder 21 and 36 H. P. motors—1912 models, every one of them.

We are also prepared to equip your boat with a multiple unit power plant up to 108 H. P.—kerosene or gasoline fuel.

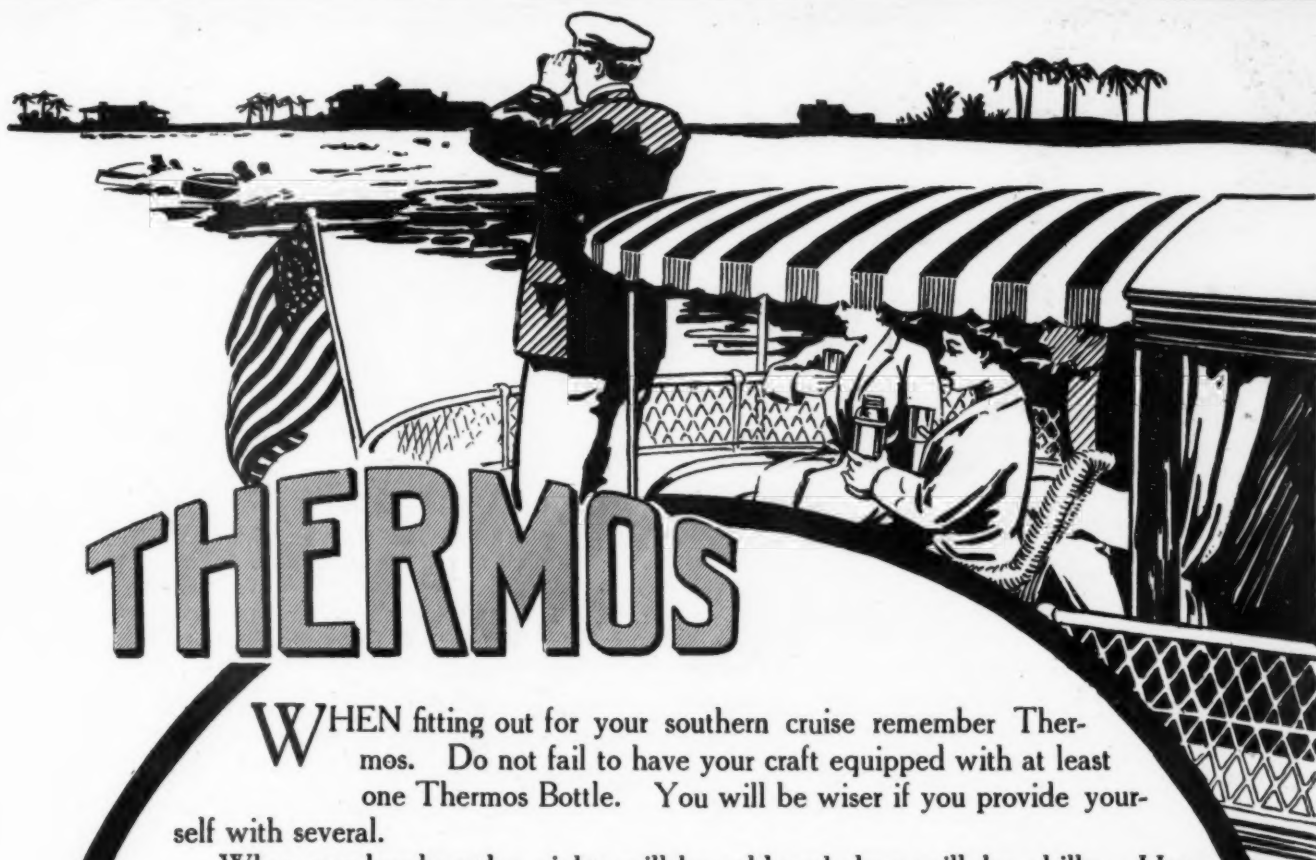
If you want your motor in a hurry—wire your order—we can make immediate shipments.

A postal brings the big catalog and any other information you might care to ask for.

GRAY MOTOR CO.

1222 U. S. Motors Bldg.

DETROIT, MICH.



THERMOS

WHEN fitting out for your southern cruise remember Thermos. Do not fail to have your craft equipped with at least one Thermos Bottle. You will be wiser if you provide yourself with several.

When you head south—nights will be cold and days will be chilly. Hot coffee, cocoa, tea, etc. will then make you comfortable and keep you in good health.

Later—in southern waters—Thermos will always have a deliciously cold drink ready for you and your guests.

Thermos Bottles keep any liquid ice cold for 72 hours or piping hot for 24 hours.

Thermos Bottles \$1.00 up.

A New and Delightful Thermos Article

The Thermos Carafe is especially suitable for motor yachts of all sizes.

The Thermos Carafe is handsome in design and finish. It is provided with a ground glass stopper which is attached by a German Silver Chain.

The Thermos Carafe is ideal for drinking water either on board your yacht or in your home.

The Knickerbocker and new Vanderbilt Hotels of New York have supplied all guest rooms with Thermos Carafes, which are always kept full of chilled water.

The famous New York Yacht Club and the Metropolitan Club of that City have also adopted the Thermos Carafe for all ice water service.

Thermos Carafes \$5.00.

Thermos Lunch Kits and Lunch Sets are used by thousands of yachtsmen. The Kit is a neat, easily carried case. Embodied in it are two metal compartments for sandwiches, etc. A Thermos Bottle comes in every Kit. Thermos Lunch Sets contain Thermos Bottles, plates, knives, forks, napkins, etc.

Thermos Lunch Kits \$2.50 to \$7.50

Thermos Motor and Yachting Sets \$16.50 to \$75

Write for Catalog

The Thermos 34 page Catalog will be sent you without charge. It is filled with illustrations and descriptions of Thermos articles. You should surely have it before you do your Christmas shopping.

Buy Thermos at any good store. Look for the name Thermos on the bottom of any article you buy. It is the word that imitators dare not use. Let it protect you from imposition.

American Thermos Bottle Co.
Thermos Building
NEW YORK



YACHT AND BOAT BUILDING BOOKS

Rudder HOW-TO Series

The most valuable set of yacht and boat-building books ever published. 3,000 boats have been built from the lines printed in these books. Successfully sailed in every clime and upon every sea. Full detail drawing of all parts, showing what it is and how to make it. Text is extremely simple.

The Power Boat

Its design and construction. We have just gotten out in book form a very complete work by E. B. Scock, and it is the only book on the subject. Powerboatmen will find it invaluable. Reprinted from back numbers of The Rudder, and very carefully illustrated throughout with lines, plans and working drawings of boats in various stages of construction. Contents: Displacement, Midship Section Coefficient, Trim, Propulsion of Yachts, Powering, Patterns of Curves, The Design, Prismatic Coefficient, Center of Buoyancy, Resistance, The Screw Propeller, Trial Trip, Tools and Instruments, Construction, Designs of Various Types. Price, \$1.00.

How to Design a Yacht

By Chas. G. Davis. A simple, yet comprehensive treatise on the art and practice of designing yachts. Illustrated with several score of pictures and plans. A child understandable book, giving every detail of the work, from spreading the paper to calculating the displacement. Lines and plans of twenty characteristic boats. Diagrams of the different rigs. How to begin. What to use. Paper and tools. Nothing omitted that will make an understanding of the art easy; nothing inserted that will complicate or confuse the beginner. Price, \$2.00.

How to Build a Sea Bird

Detail plans and full instructions for building a boat like the famous little yawl that crossed the Atlantic Ocean in 32 days. Price, \$1.00.

How to Build a 32-Foot Power Cruiser

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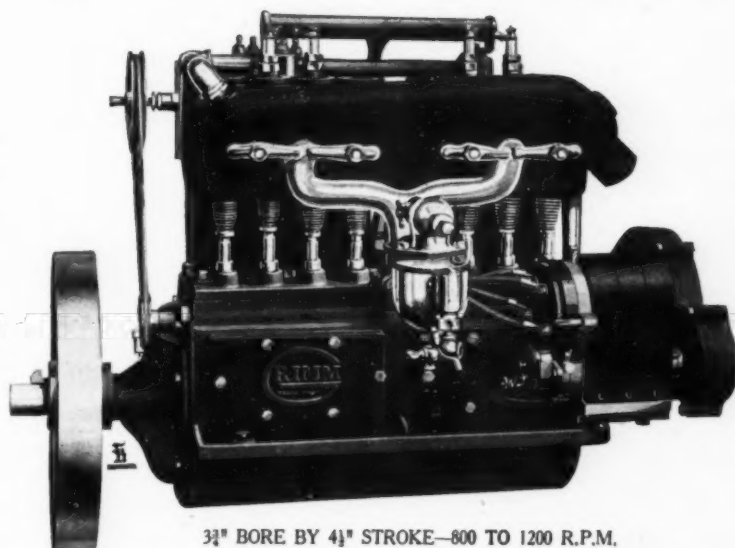


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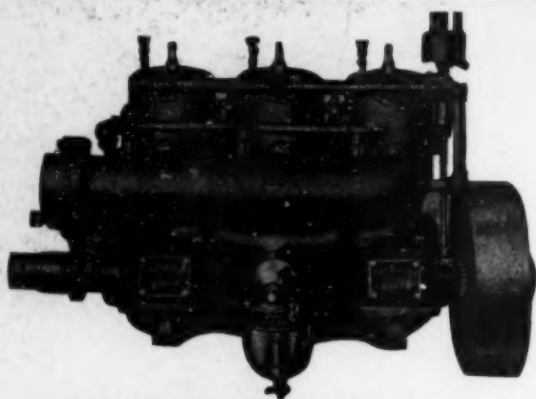
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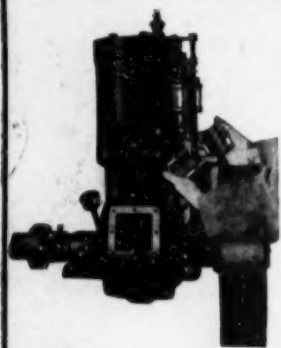
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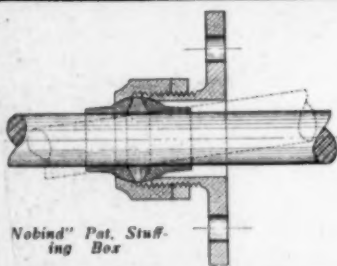
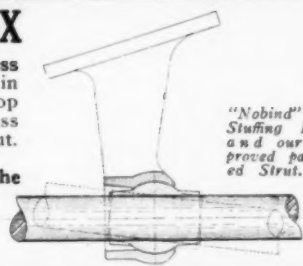
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